OPERATION
AND
SERVICE MANUAL

MODEL SV-15A

T.O.S. No. 9
SERIAL NO.
AM-FM SWEEP/SIGNAL

Telonic® INDUSTRIES, INC.

WARRANTY

TELONIC INSTRUMENTS AND ACCESSORIES

Products manufactured by TELONIC INSTRUMENTS; Division of Telonic Industries, Inc. are guaranteed against defective materials and workmanship for a period of one year (vacuum tubes excepted) from date of purchase. This warranty does not apply to instruments that have been altered, improperly handled or damaged in any way beyond our control.

Instruments must be examined immediately upon receipt, since claims for damage in transit will not be honored by the carrier unless prompt action is taken.

CHANGES IN SPECIFICATIONS

The right is reserved to change the published specifications of equipment at any time, and to furnish merchandise in accordance with current specifications, without incurring any liability to modify equipment previously sold.

RETURNING EQUIPMENT TO FACTORY

Factory service is available for repair and readjustment of this instrument. However, a description of the trouble, plus the MODEL AND SERIAL NUMBERS of the unit should be forwarded FIRST, whereupon instructions for correcting the trouble OR authorization for returning the equipment will be given. This applies to all units, whether under warranty or not.

MODEL SV-15A

T.O.S. No. 9
SERIAL NO.
AM-FM SWEEP/SIGNAL
GENERATOR

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SECTION 1

GENERAL INFORMATION

1-1. SPECIFICATIONS.

1-2. Table 1-1. lists the specifications for the SV-15A AM-FM SWEEP/SIGNAL GENERATOR.

1-3. DESCRIPTION. (See Figure 1-1.)

1-4. The SV-15A AM-FM SWEEP/SIGNAL GENERATOR is a solid state modular unit designed for the alignment of RF and IF circuits in AM-FM receivers. The SV-15A provides output frequencies within the commercial broadcast bands and standard receiver intermediate frequencies. Three output connectors facilitate the alignment of AM-FM receivers without disconnecting cables.

TABLE 1-1

Specifications	
Band I:	
Channels Available-	5
RF Output Frequency Range-	540 to 1600 KHz
Type Outputs-	Crystal Controlled AM Modulation
Modulation	
Frequency-	480 Hz (Synchronized with line voltage)
Percentage-	30 ± 1%
Distortion-	8% Maximum at 30% modulation
	AM out 250MVRMS into 50Ω
Band II:	
Channels Available-	3
RF Output	
AM-IF (Narrow) (50% Duty Cycle):	
Center Frequency-	445 to 465 KHz
Sweep Width-	40 to 60 KHz
Markers:	
Frequencies-	447.5 KHz 455.0 KHz 462.5 KHz
Accuracy-	0.05%
	IF out 250MV

Table 1-1 (Cont)

Band II: (Cont)	
FM-IF (Medium) (50% Duty Cycle):	
Center Frequency-	10.6 to 10.8 MHz
Sweep Width-	1 MHz
Markers-	3
Frequencies-	75 KHz below specified Center Frequency 75 KHz above specified Center Frequency Specified Center Frequency
Accuracy-	0.05%
FM-IF (Crystal Controlled)-	10.6949 to 10.7051 MHz IF out 260mV
Band III:	
Channels Available-	5
RF Outputs-	Swept 50% Duty Cycle (Wide) Unswept-Unblanked FM Modulated
Center Frequencies-	88 to 108 MHz
Sweep Width-	1.8 to 2.2 MHz
Markers-	3
Frequencies-	75 KHz below specified Center Frequency 75 KHz above specified Center Frequency Specified Center Frequency
Accuracy-	0.05% FM out 260mV
Sweep Rate-	line frequency
Blanking (Sweep)-	line frequency
Duty Cycle	45 to 55%
Depth	off during retrace
Turn on overshoot:	
Amplitude	10% of RF Output level maximum
Period	0.1 Millesecond
Linearity (Display)	1.2:1
Modulation AM/FM	Synchronized to 8 times line frequency.
Percent of Modulation:	
AM	30 ± 1% of carrier amplitude
FM	22.5 KHz ± 750 Hz

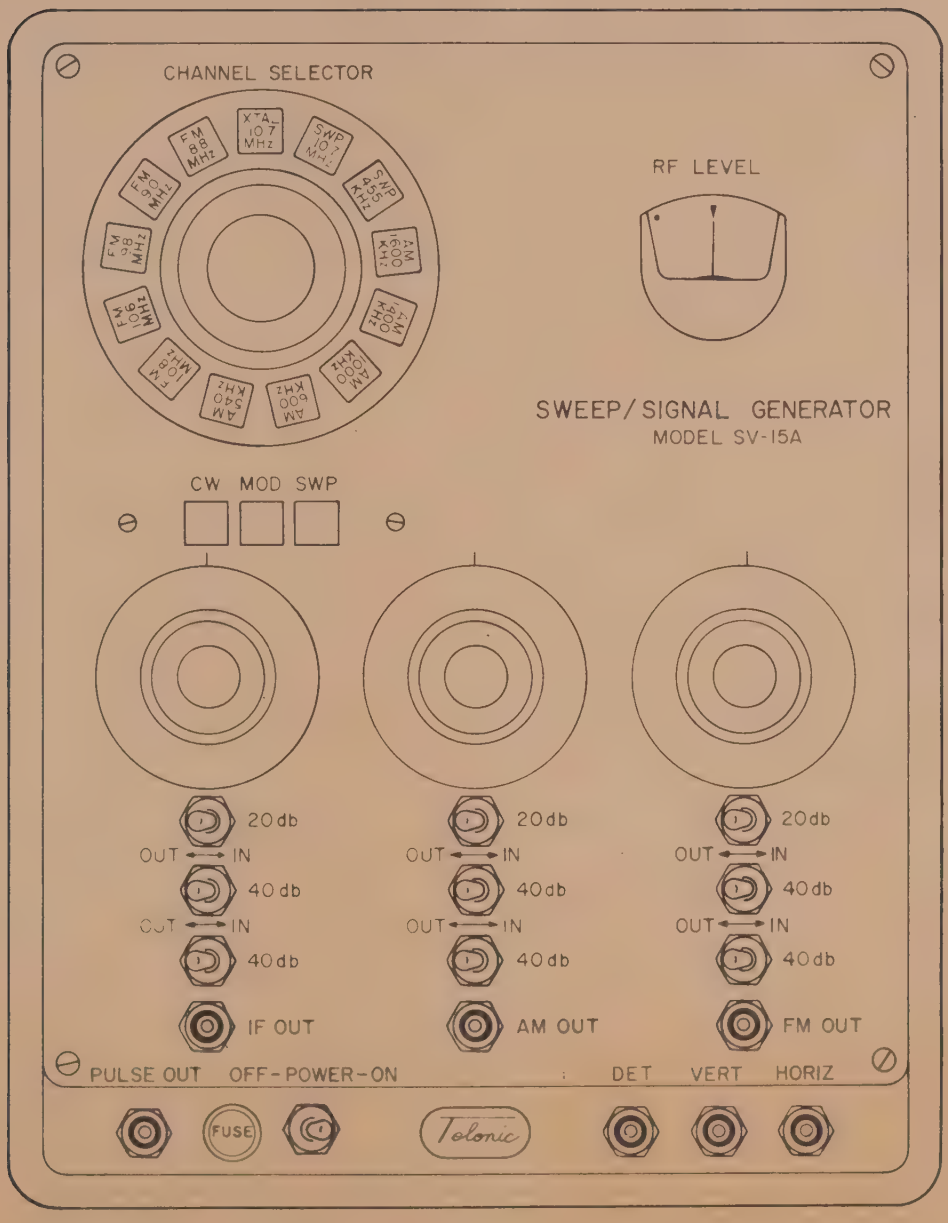


Figure 1-1. SV-15A AM-FM SWEEP/SIGNAL GENERATOR

SECTION II

OPERATING INSTRUCTIONS

2-1. GENERAL.

2-2. This section provides the complete functional description and operating instructions for the SV-15A AM-FM SWEEP/SIGNAL GENERATOR.

2-3. CONTROL PANEL DESCRIPTION. (See figure 2-1.)

2-4. Table 2-1 provides a complete functional description of all Front Panel Controls and Connectors.

TABLE 2-1.

Front Panel control functional Descriptions

CHANNEL SELECTOR-	Provides a calibrated dial to select test frequency required from 455 KHz to 108 MHz.
CW pushbutton-	Provides CW mode of operation.
MOD pushbutton-	Provides Modulation mode of operation.
SWP pushbutton-	Provides Sweep mode of operation.
IF OUT Attenuator dial-	Provides a variable calibrated attenuation from 0 to 25dB.
IF OUT 20db OUT-IN Switch-	Provides a fixed 20 db attenuation.
IF OUT 40db OUT-IN Switch-	Provides fixed 40db attenuation (2)
AM OUT Attenuator dial-	Provides a variable calibrated attenuation from 0 to 25dB.
AM OUT 20db OUT-IN Switch-	Provides a fixed 20db attenuation
AM OUT 40db OUT-IN Switch-	Provides fixed 40db attenuation (2)
FM OUT Attenuator dial-	Provides a variable calibrated attenuation from 0 to 20dB.
FM OUT 20db OUT-IN Switch-	Provides a fixed 20db attenuation.
FM OUT 40db OUT-IN Switch-	Provides fixed 40db attenuation (2).
OFF-POWER-ON Switch-	Main Power Switch
OFF-POWER-ON indicator light-	Indicates when main power is on.
RF LEVEL Meter-	Indicates proper RF level.
IF OUT Connector-	IF Output BNC Connector.
AM OUT Connector-	AM Output BNC Connector.
FM OUT Connector-	FM Output BNC Connector.
PULSE OUT Connector-	Pulse Marker output BNC Connector.
DET Connector-	Input BNC connector for detected signal.
VERT Connector-	Output BNC connector to oscilloscope Vertical Input.
HORIZ Connector-	Output BNC connector to oscilloscope Horizontal Input.

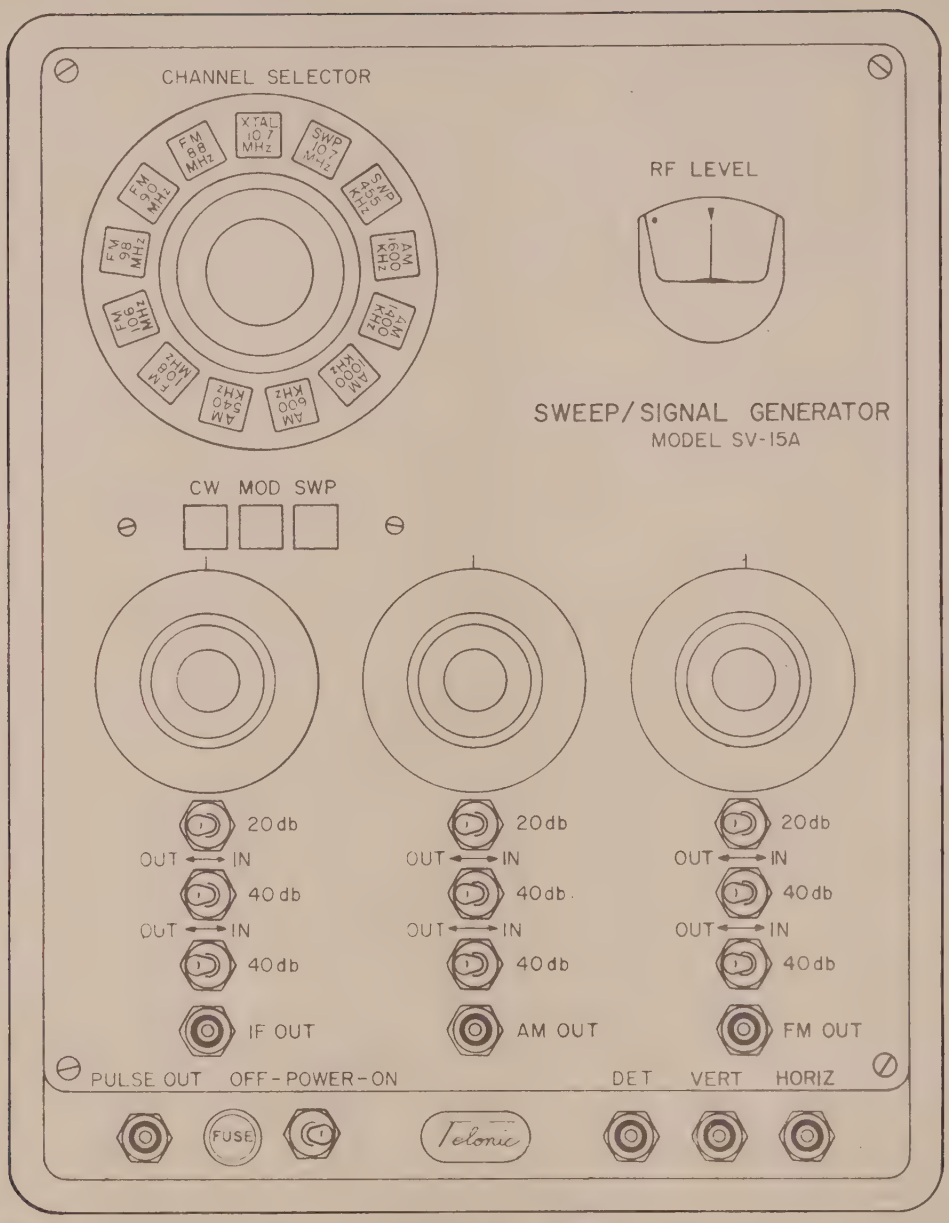


Figure 2-1. SV-15A Front Panel Controls

2-5. OPERATING PROCEDURE

a. Connect the unit under test as shown in figure 2-2.

b. Set the OFF-POWER-ON Switch to the ON position.

NOTE

Allow five minutes warmup.

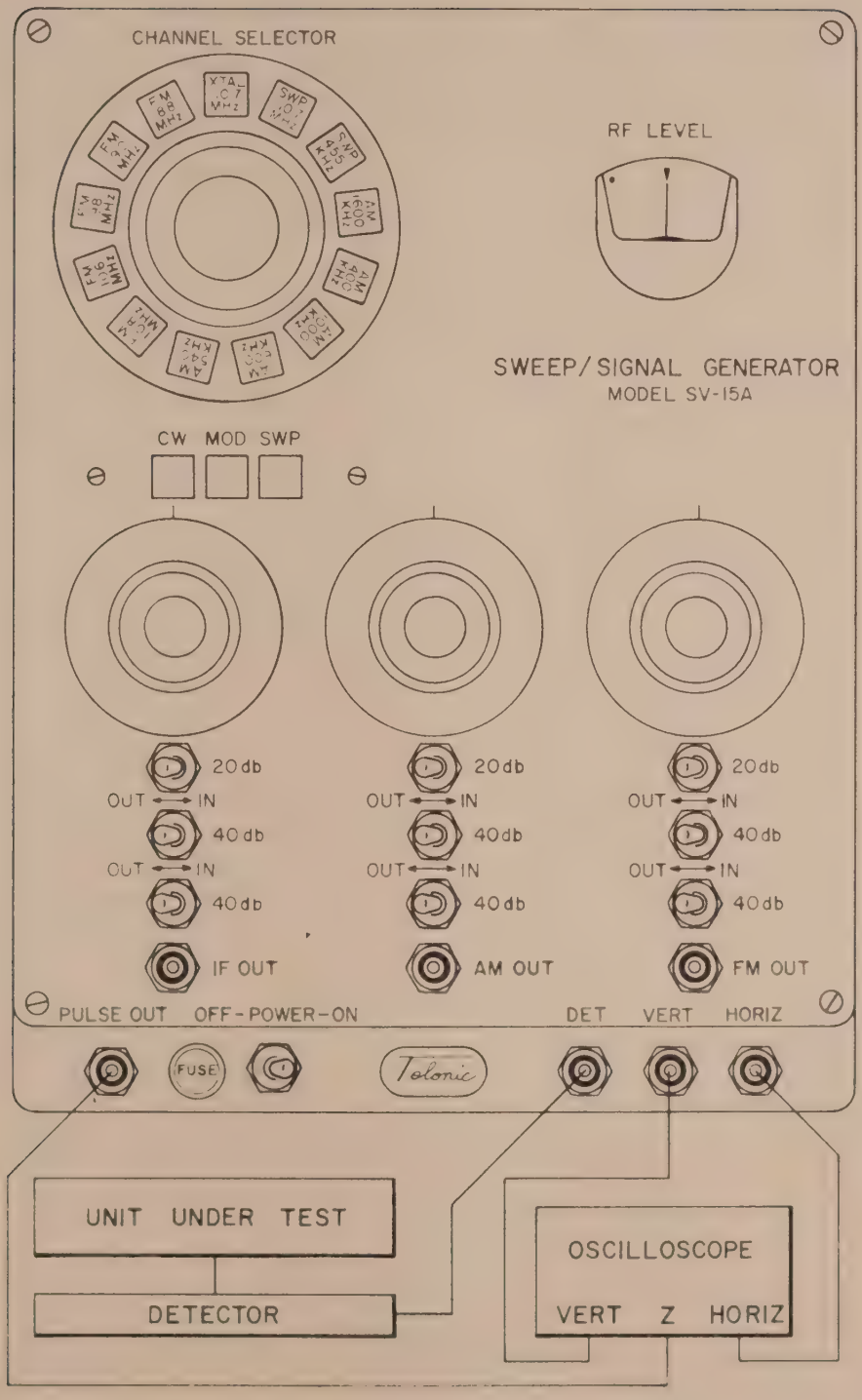


Figure 2-2. Typical Test Connections

c. Rotate the CHANNEL SELECTOR dial to the desired frequency position.

d. Depress the desired Pushbutton mode switch.

e. Insert the proper attenuation into the circuit of each of the three outputs using the attenuator dials and toggle switches as required.

SECTION III

PRINCIPLES OF OPERATION

3-1. GENERAL.

3-2. This section provides a brief general description of the major circuits of the SV-15A AM-FM SWEEP/SIGNAL GENERATOR.

3-3. MODULAR CONSTRUCTION.

3-4. The SV-15A is a solid state modular unit consisting of twenty-five removable modules.

3-5. POWER SUPPLIES.

3-6. 45 volts AC is provided to the Power Supplies by the input line transformer. This transformer primary is normally wired in parallel for use with 115 VAC lines. The windings can easily be reconnected in series for use with 230 VAC lines.

3-7. ± LOW VOLTAGE RECTIFIER AND INPUT-FILTER. (Module 1.)

3-8. This module provides ±45 VDC unregulated filtered output voltage to the ±24V Regulator module.

3-9. +24 VOLT REGULATOR. (Module 3.) (Refer to figure 3-1.)

3-10. The +24 VOLT REGULATOR provides series regulated +24 volts to the Low Voltage Output Filter module. The noise and ripple voltage is maintained at a constant level by the negative feedback provided the amplifier transistor.

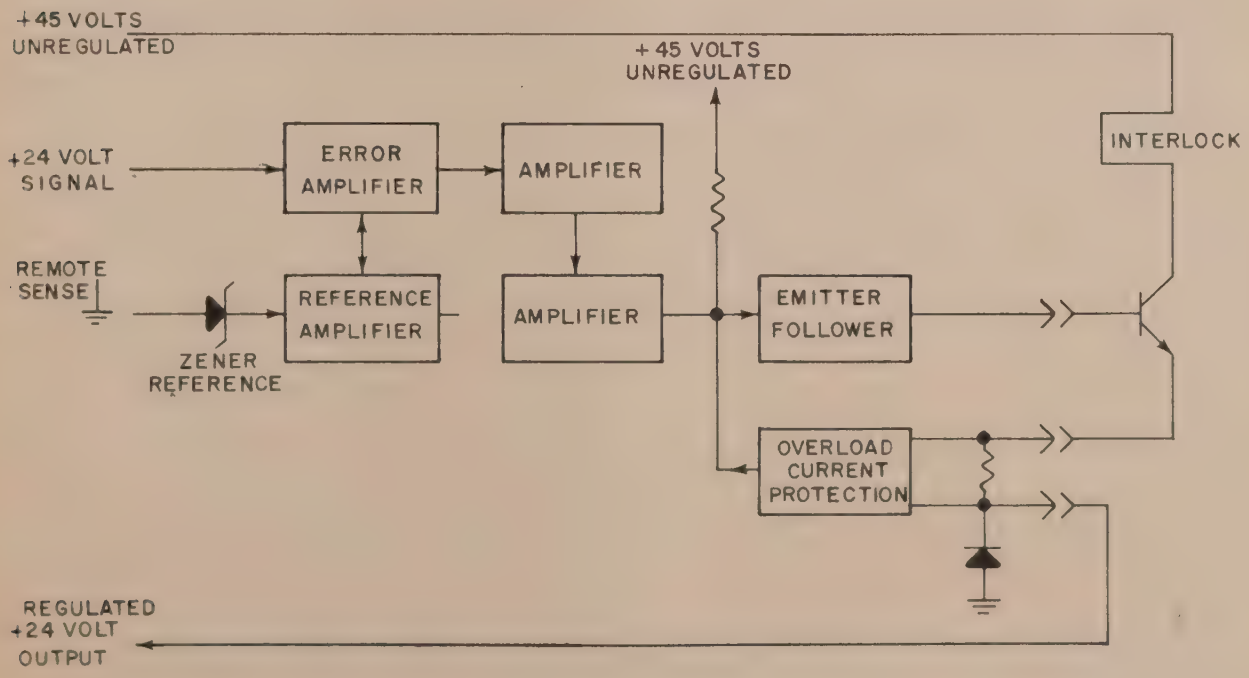


Figure 3-1. +24 Volt Regulator Block Diagram

3-11. -24 VOLT REGULATOR. (Module 4.) (Refer to figure 3-2.)

3-12. The negative regulator circuit is similar to the positive regulator circuit explained in paragraph 3-10.

3-13. LOW VOLTAGE OUTPUT FILTERS (Module 2.)

3-14. The Low.Voltage Output Filter provides an interlock and filter for the ±24 Volt supply voltage.

3-15. FULL WAVE BRIDGE RECTIFIER AND FILTER (Module 5.)

3-16. 160 rms, 60 Hz is fed to the full-wave bridge rectifier from the input line transformer. The rectified output is filtered by the two stage filter.

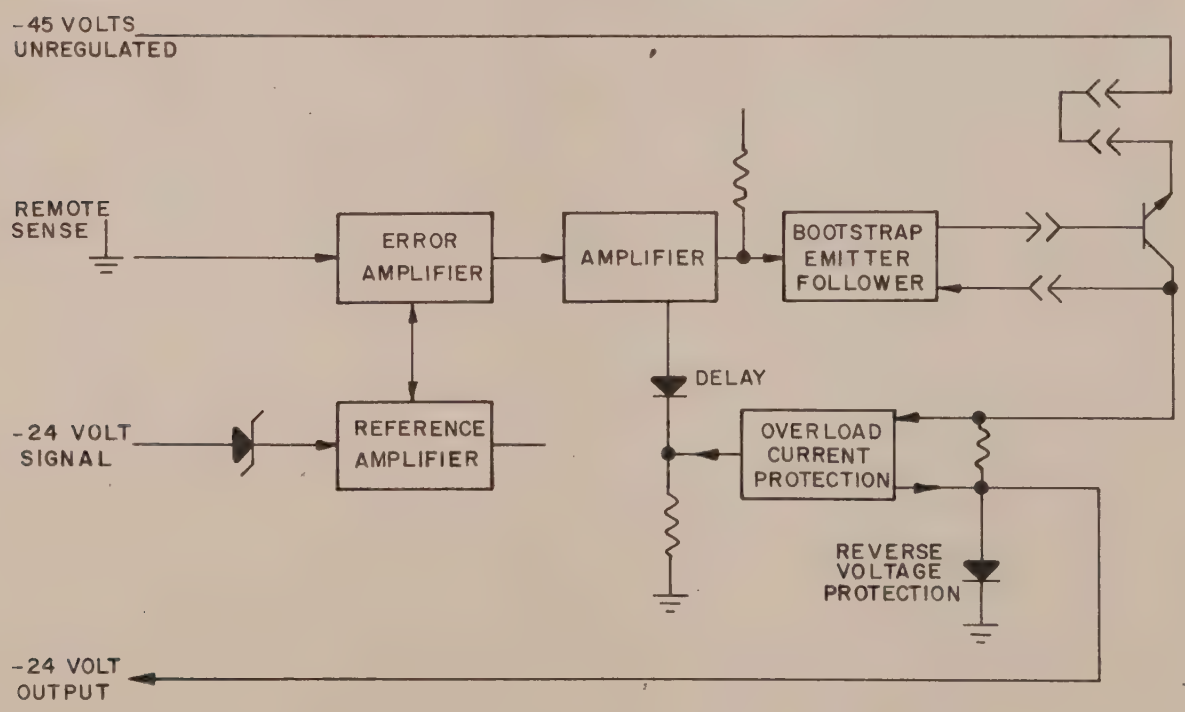


Figure 3-2. -24 Volt Regulator Block Diagram

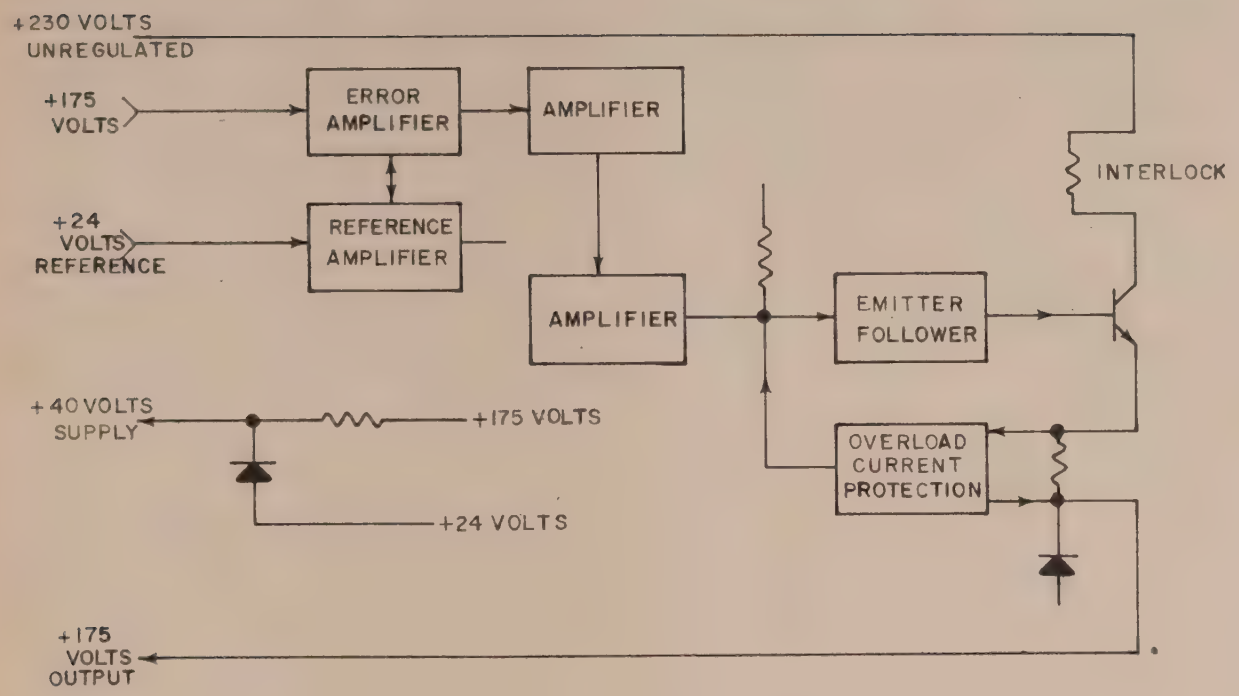


Figure 3-3. 175 Volt Regulator Block Diagram

3-17. 175 VOLT REGULATOR (Module 6) (Refer to figure 3-3.)

3-18. The unregulated 230 VDC from the 175 V Rectifier and output filter module is fed through a dropping resistor to the series regulator transistor mounted on the main chassis. The output of the series regulator is the regulated 175 VDC supply voltage. The 175 VDC supply voltage is sampled by the error amplifier and compared to the reference amplifier. The output of this comparator stage is passed throug two stages of amplification and fed through the emitter-follower driver to the base of the series regulator transistor.

3-19. SQUARE AND TRIANCLE WAVE GENERATOR. (Module 101). (Refer to figure 3-4.)

3-20. This module is composed of two independent circuits which may be externally connected to produce both square wave and triangular wave outputs.

3-21. The square wave is produced by applying a sine wave input to two opposite phased square wave amplifiers and zero-crossed to produce a square wave output wit 50% duty cycle.

3-22. The triangle wave is produced by applying a square wave to the integrat circuit. Both direct and capacitive coupled outputs are provided.

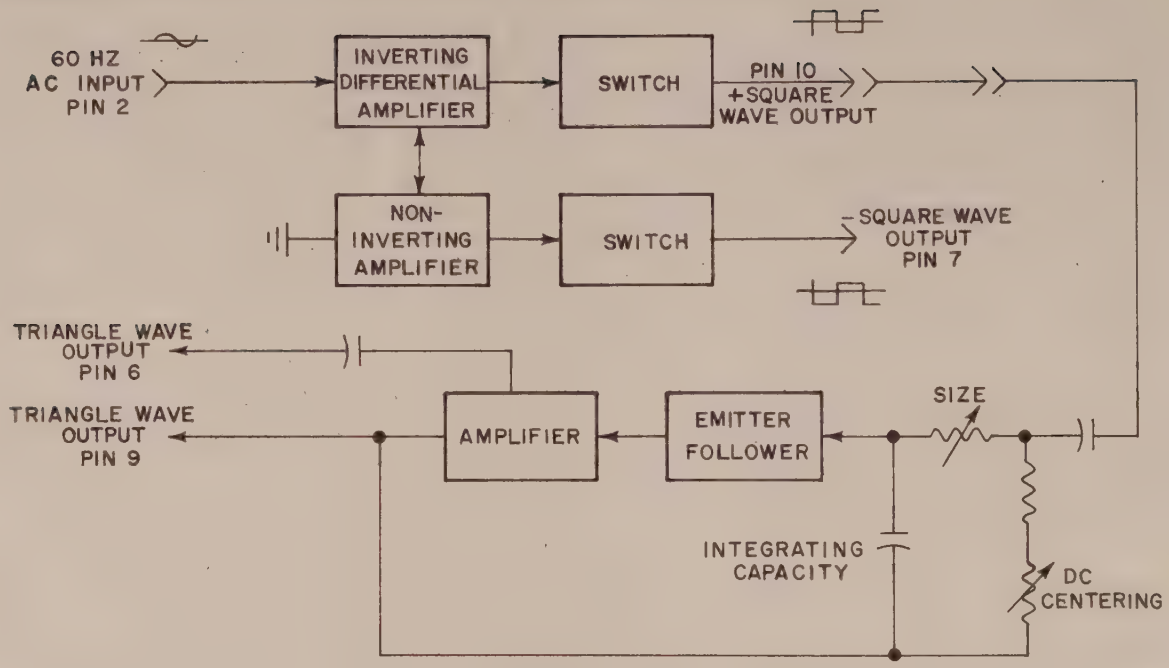


Figure 3-4. Square and Triangle Wave Generator Block Diagram

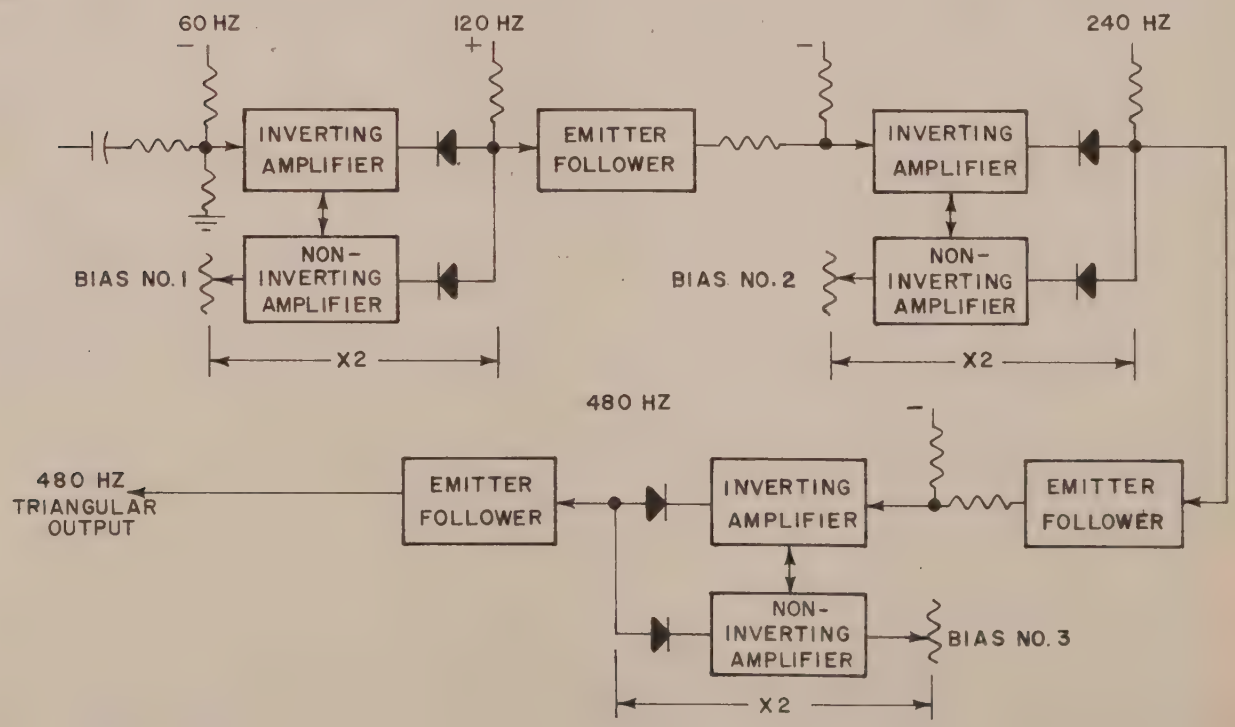


Figure 3-5. Triangular Wave Multiplier Block Diagram

3-23. TRIANGULAR WAVE MULTIPLIER. (Module 102A.) (Refer to figure 3-5.)

3-24. The Triangular Wave Multiplier receives the 60 Hz triangular wave from the Square and Triangle Wave Generator module. This input signal is applied to three stages of frequency doubling providing a 480 Hz triangular wave output.

3-25. 480 HERTZ SOURCE (Module 102B) (Refer to figure 3-6.)

3-26. The Triangular Wave Multiplier module feeds the 480 Hz triangular wave to the two 480 Hz tuned amplifiers. The amplifiers output is two 480 Hz sinusoidal wave.

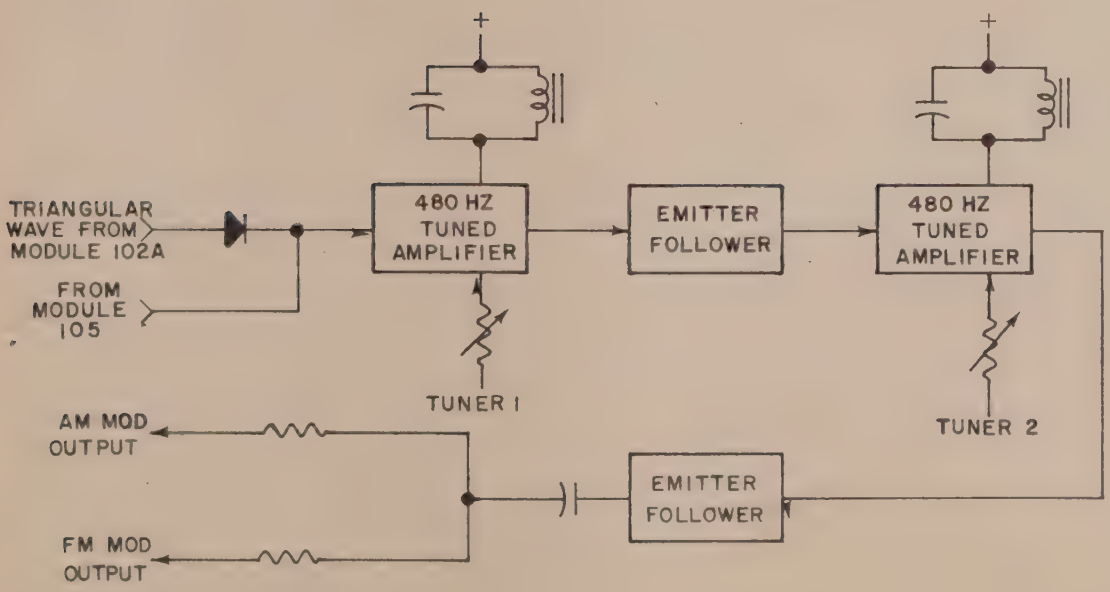


Figure 3-6. 480 Hertz Source Block Diagram

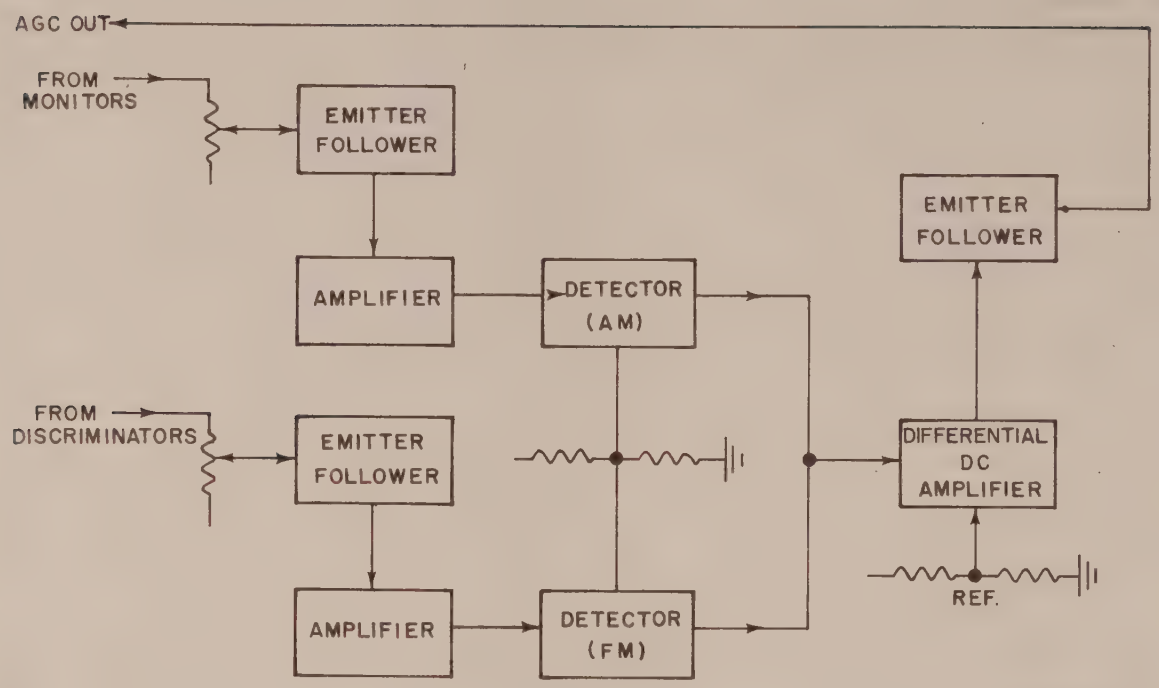


Figure 3-7. 480 Hertz AGC Block Diagram

3-27. 480 HERTZ AGC (Module 105.) (Refer to figure 3-7.)

3-28. Two dc input voltages, one from a fixed resistive voltage divider; the other a amplified and detected AGC sample is fed to a two input dc differential amplifier. The output signal is a control voltage.

3-29. SWEEP DRIVE. (Module 103.) (Refer to figure 3-8.)

3-30. The drive and error voltage inputs from the channel centering and Square and Triangle Wave Generator modules are fed through a resistive adder and applied to the bootstrapped complementary emitter-follower. The emitter-follower output is fed to resistive divider to obtain a negative dc level and fed through a second emitter-follower to prevent overloading of the preceding stage. The signal voltage present is applied through a 10K resistor to a ground base amplifier. The collector load of the amplifier is provided by the Shaper module. A Darlington connected pair of emitter-followers is provided to avoid overloading the shaper circuit. The dc level of the emitter-follower output waveform is adjusted by the variable current source and a resistor before being fed to the varicap.

3-31. The Linearity potentiometer is provided for sweep display adjustments, all linearity adjustments should be made before adjusting the Centering potentiometer. The Centering potentiometer is provided to adjust the dc level of the current ramp applied to the Shaper module.

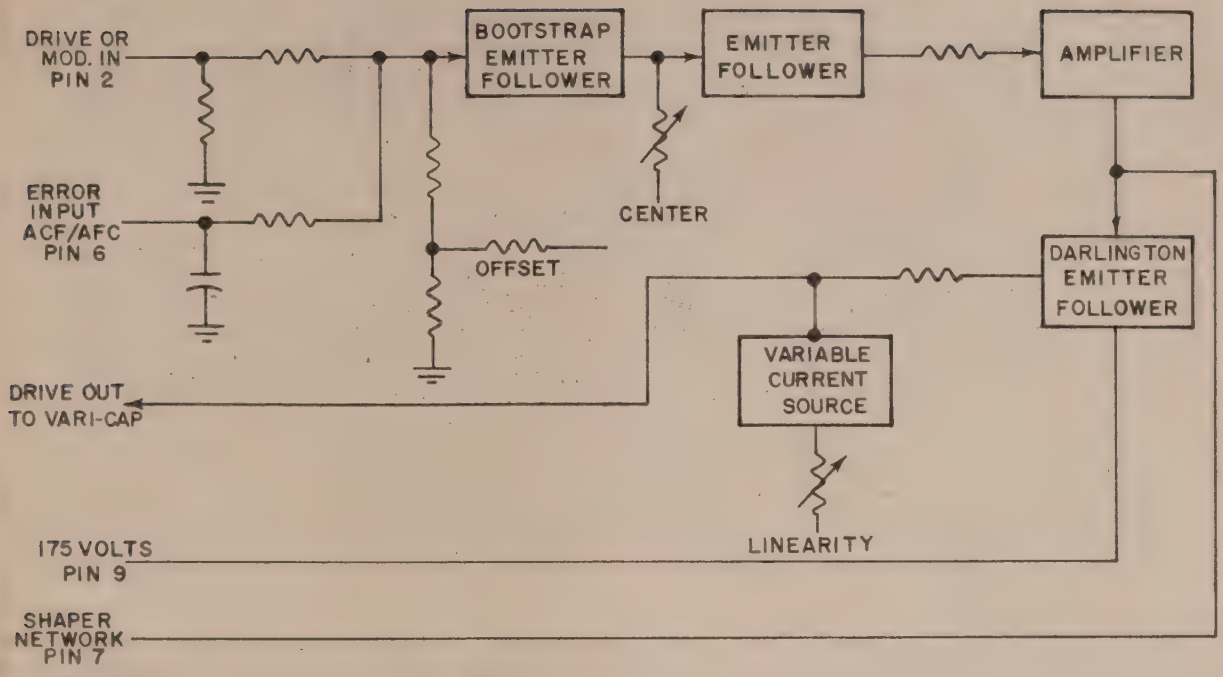


Figure 3-8. Sweep Drive Block Diagram

3-32. SHAPER. (Module 104.) (Refer to figure 3-9.)

3-33. As an injected current steadily increases, resistors of decreasing value are successively switched into parallel by a series of diodes connected to a voltage divider string.

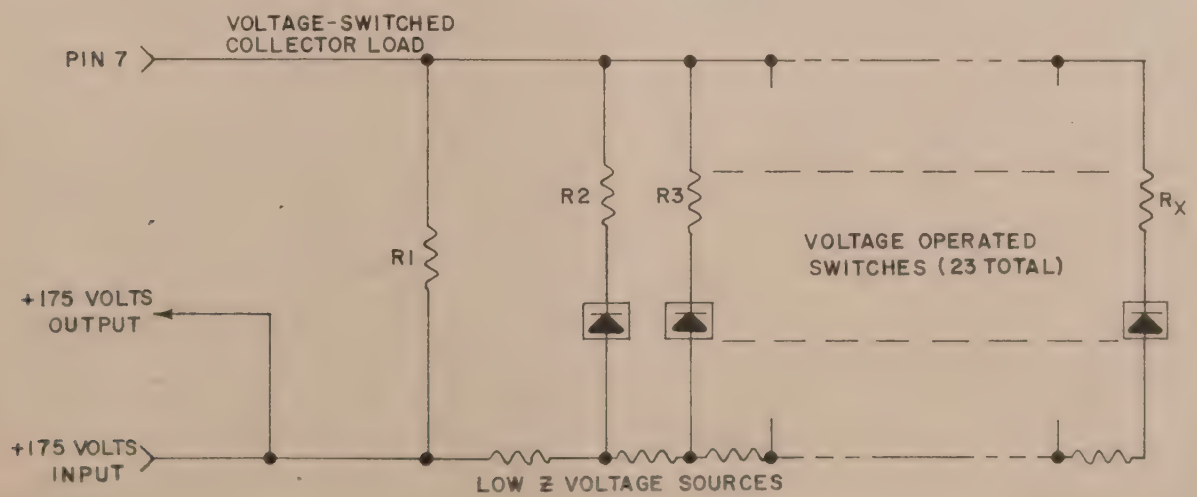


Figure 3-9. Shaper Block Diagra

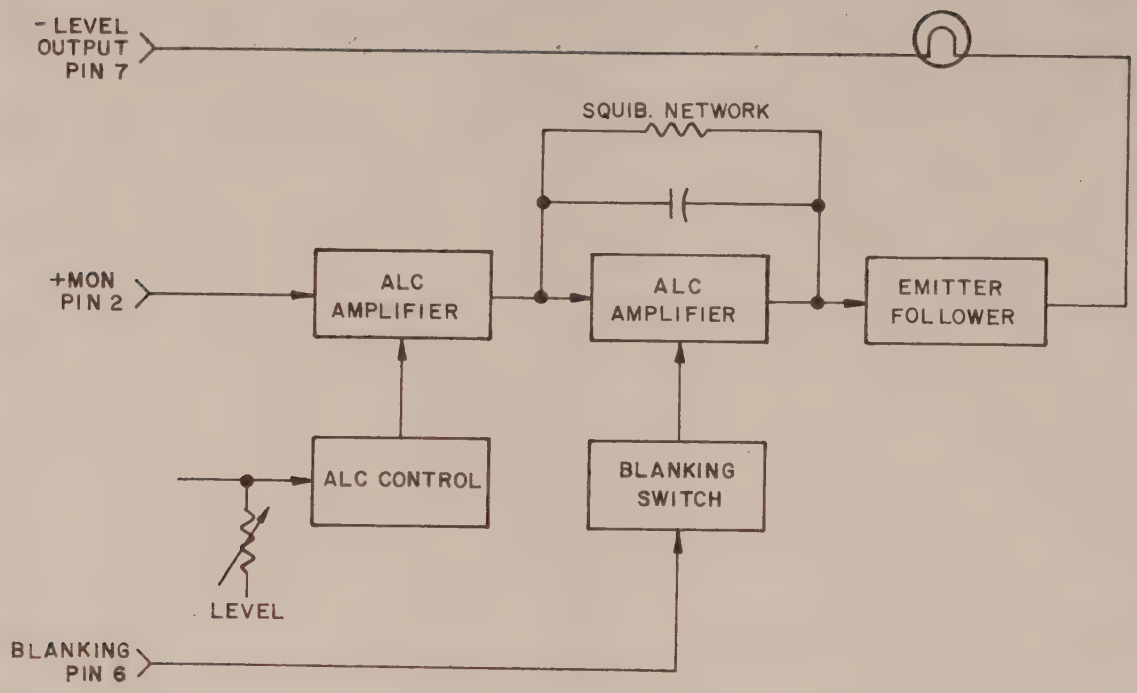


Figure 3-10. Marker Leveler Block Diagram

3-34. MARKER LEVELER. (Module 106.) (Refer to figure 3-10.)

3-35. A detected RF signal is applied to the base of one differential input amplifier, and a variable reference voltage is applied to the base of the second stage amplifier. The amplified difference of the two input signals is applied to a common emitter stage. The emitter voltage is maintained at approximately 18 volts by a zener diode. The amplifier output signal is coupled out by an emitter-follower.

3-36. RF LEVELER (Module 107.) (Refer to figure 3-11.)

3-37. The RF Leveler module is similar to the Marker Leveler explained in paragraph 3-35. A second blanked output is available in this module for driving a blanking source transistor.

3-38. PULSE GENERATOR. (Module 108.) (Refer to figure 3-12)

3-39. Positive 0.4 volt trigger pulses are applied to the amplifier from the Crystal Filter module. The amplified input is passed through a differential circuit and fed to the one-shot multivibrator with a recovery time of 50 μsec. The output saturates the switching transistors to provide positive and negative output pulses.

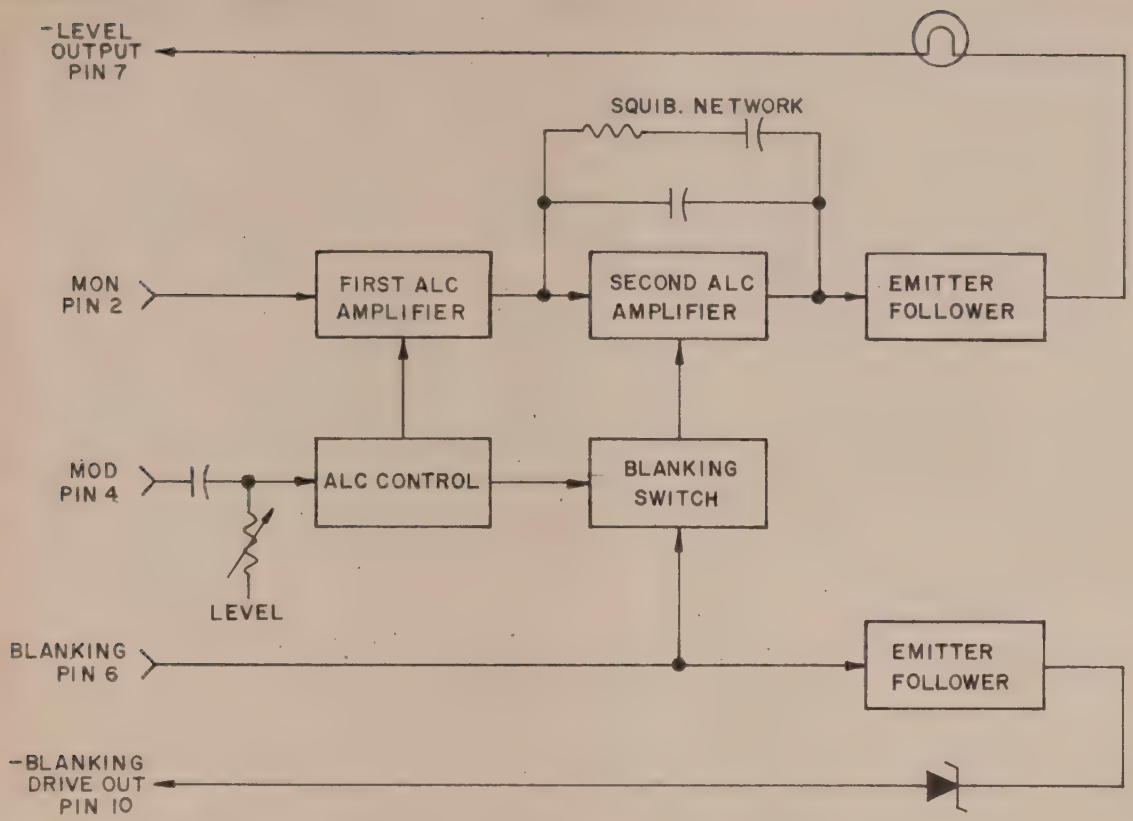


Figure 3-11. RF Leveler Block Diagram

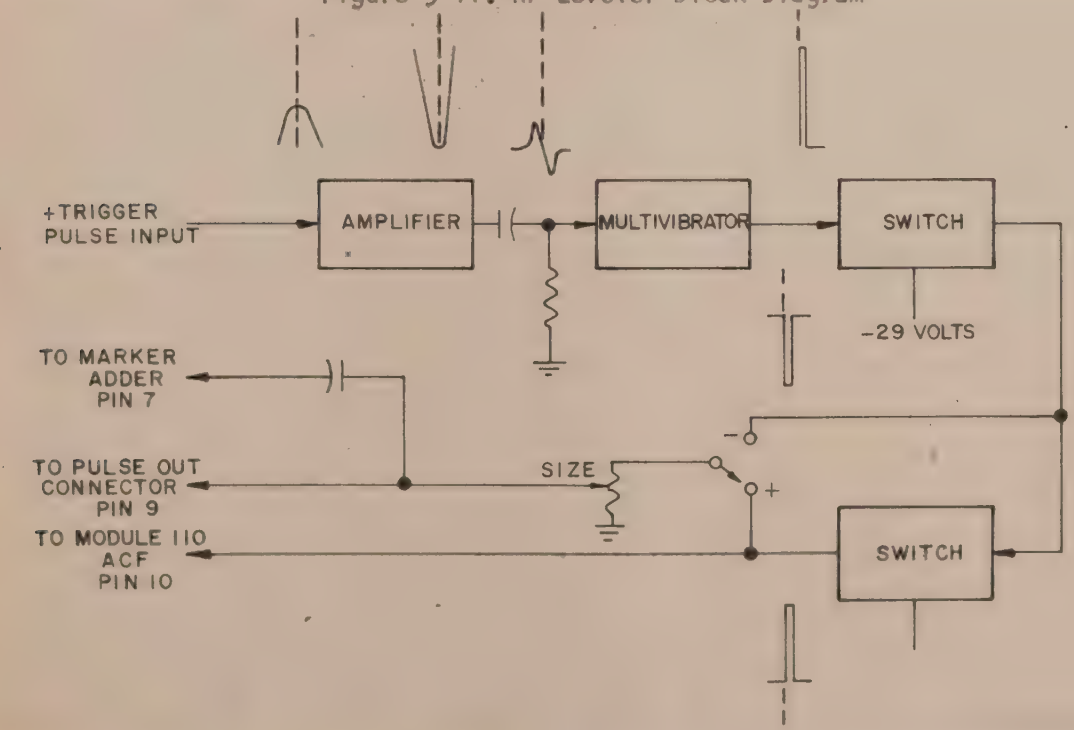


Figure 3-12. Pulse Generator Block Diagram

3-40. LEVEL/METER SET UP (Module 109)

3-41. The variable resistors are adjusted to provide proper amplitude at all output jacks when the meter indicates proper level and bias voltage for the Monitor meter rectifiers.

3-42. CHANNEL CENTERING. (Module 110.) (Refer to figure 3-13.)

3-43. The error voltage is obtained by sampling the horizontal drive waveform. Positive voltage is developed if the pulses occur late and negative voltage if the pulses occur early. A saturated switching transistor removes output from the module unless pulses are present, and a sampling transistor provides a negative bias which unsaturates this short circuit. This module is in-operative during CW and MOD modes.

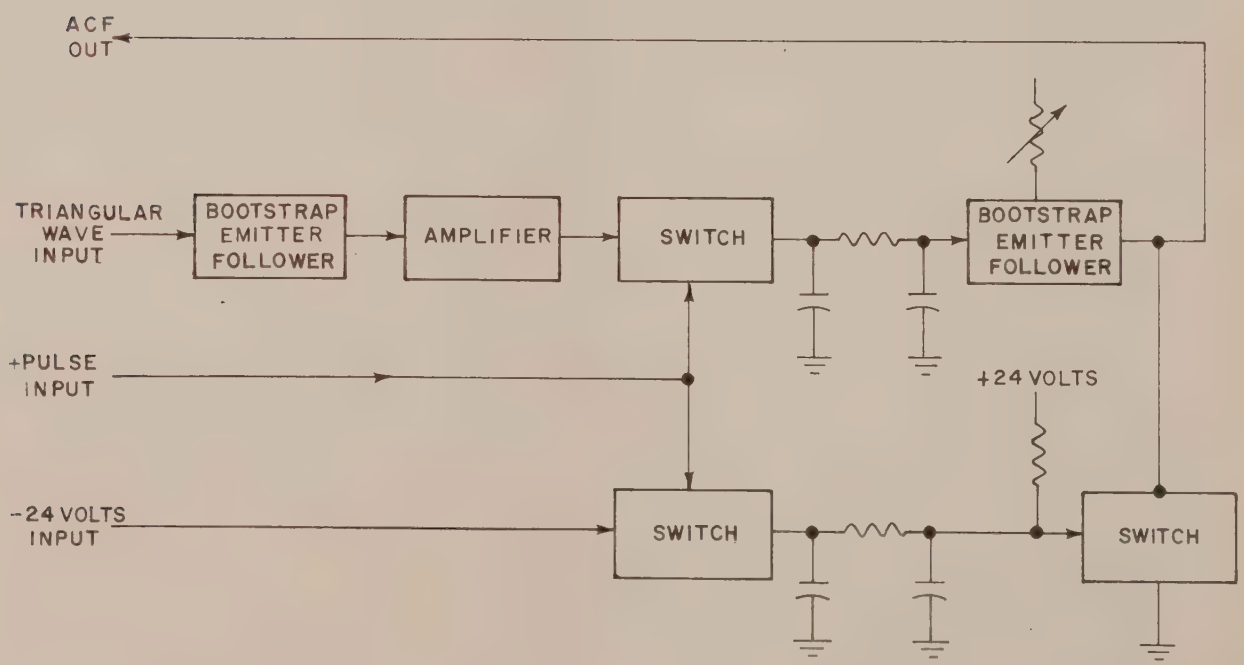


Figure 3-13. Channel Centering Block Diagram

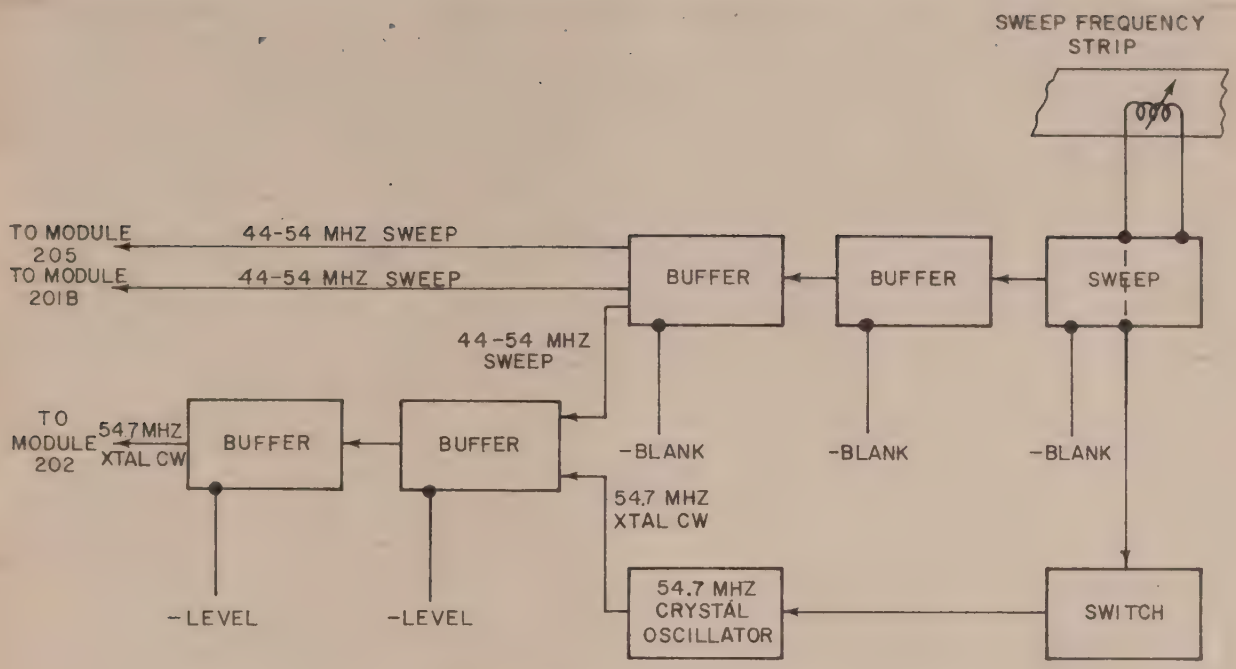


Figure 3-14. Sweep/Crystal Oscillator Block Diagram

3-44. SWEEP/CRYSTAL OSCILLATOR (Module 201A.) (Refer to figure 3-14.)

3-45. This module provides two unleveled sweep outputs isolated from the sweep oscillator, by two tuned buffer amplifiers, to the marker converter and FM multiplier.

3-46. One output which can be leveled is provided which is activated when a sweep coil is not present in the strip being used. Leveling is provided by emitter current control of two tuned buffer stages and is fed by a sweep signal coupled from the unleveled sweep output point. The buffer is driven by a 54.7 MHz crystal oscillator.

3-47. FM MULTIPLIER. (Module 201B.) (Refer to figure 3-15.)

3-48. The FM Multiplier module provides an FM-band signal by doubling the output of the Sweep/Crystal Oscillator. The band pass filter passes only the second harmonic of the input. The RF output is controlled by varying the input stage emitter circuit.

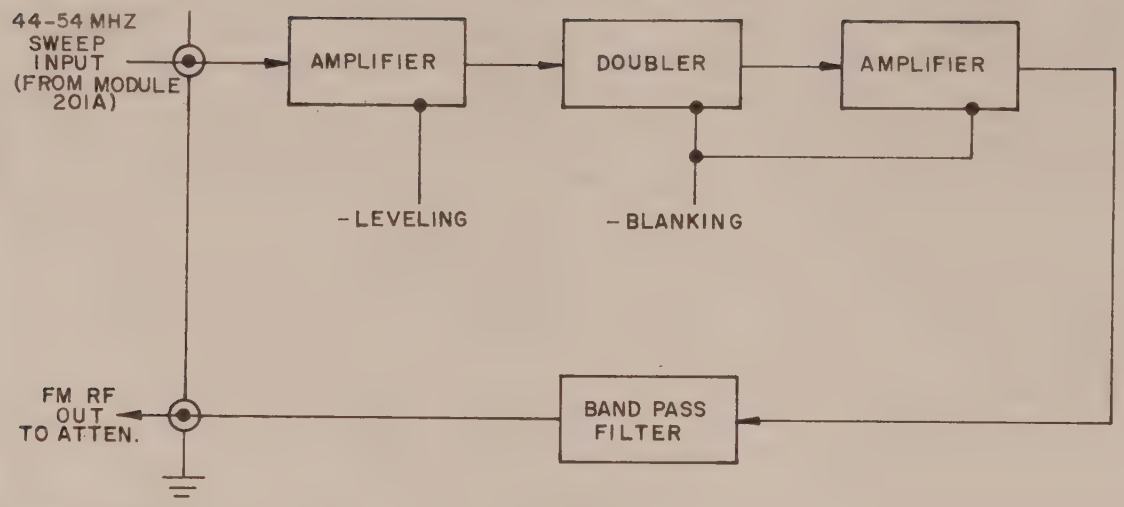


Figure 3-15. FM Multiplier Block Diagram

3-49. IF CONVERTER. (Module 202.) (Refer to figure 3-16.)

3-50. The IF Converter module provides an RF output of 0 to 20 MHz. A mixer signal, either an internal 44 MHz crystal oscillator or an external signal above 44 MHz is fed through the balanced mixer to the lowpass filter and video Amplifier. Isolation of the input signal is provided by tuned buffers.

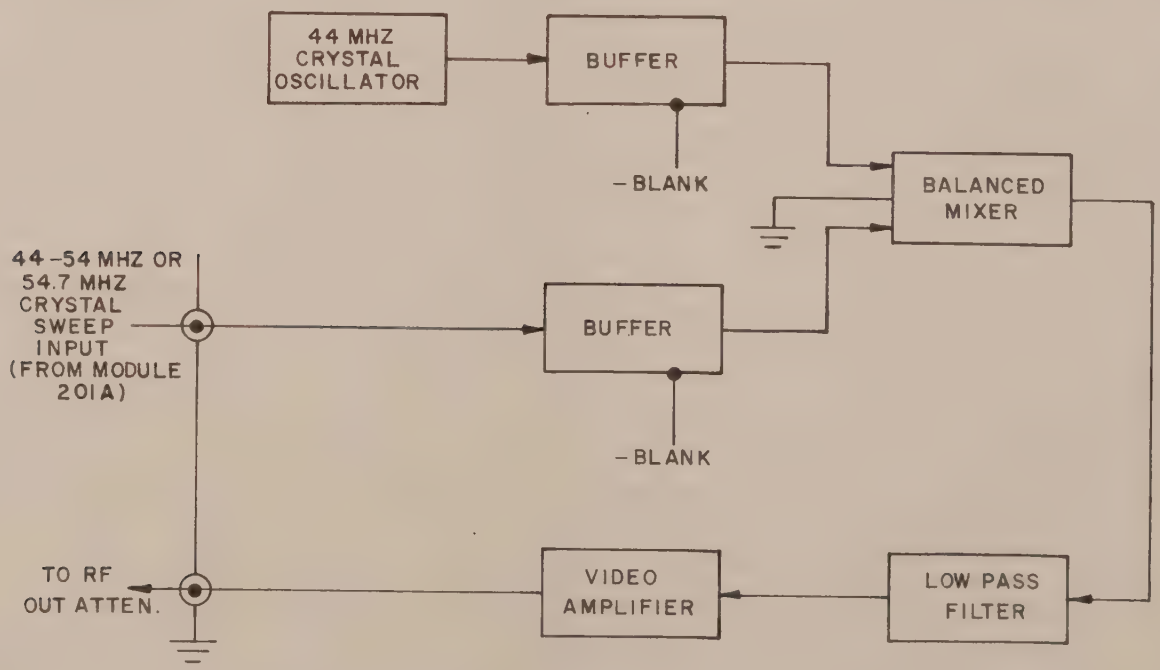


Figure 3-16. IF Converter Block Diagram

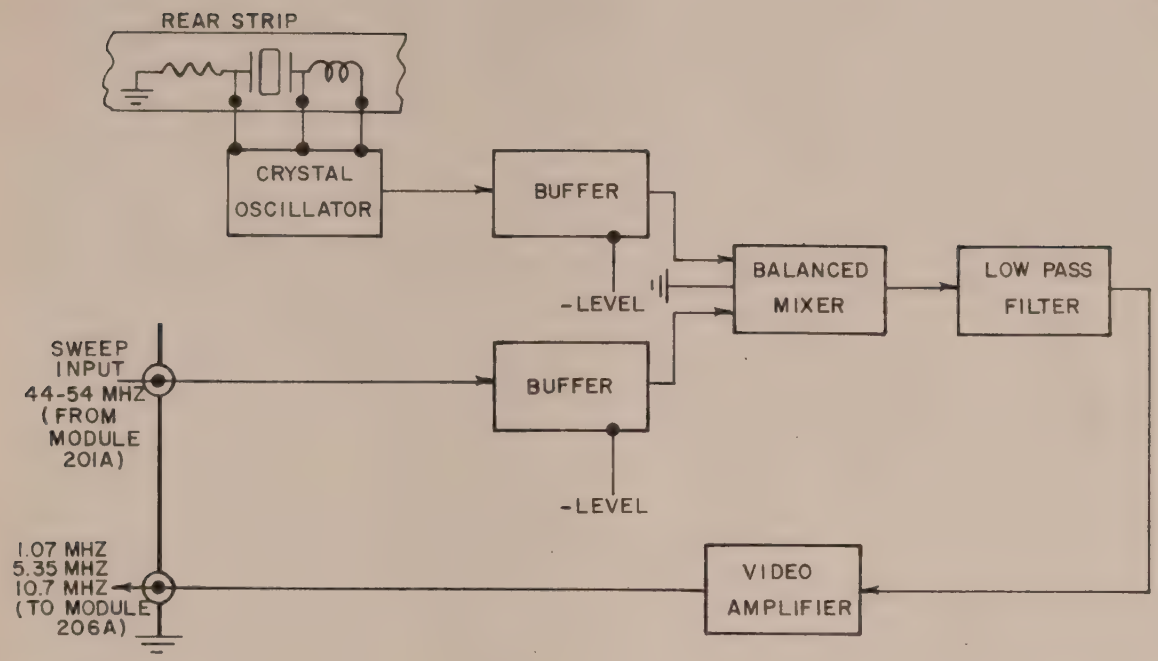


Figure 3-17. Marker Converter Block Diagram

3-51. CW OSCILLATOR. (Module 204.)

3-52. This module provides a CW RF output in the AM broadcast frequency range and consists of a CW oscillator whose frequency is determined by the CHANNEL SELECTOR switch and a corresponding output tuning capacitor is placed in parallel with the output tank circuit.

3-53. MARKER CONVERTER (Module 205.) (Refer to figure 3-17.)

3-54. Marker Converter module is similar to the IF converter module explained in paragraph 3-50.

3-55. MARKER MIXER. (Module 206A.) (Refer to figure 3-18.)

3-56. The Marker Mixer consists of three channels each tuned for one input frequency provided by the Marker Converter module. The input frequency is fed through the input buffer amplifier stage. The output is applied to the output buffer and amplifier stages to the Discriminator and Crystal Filter modules. The low frequency channel passes the input frequency through a multiplier before feeding it to the output stage.

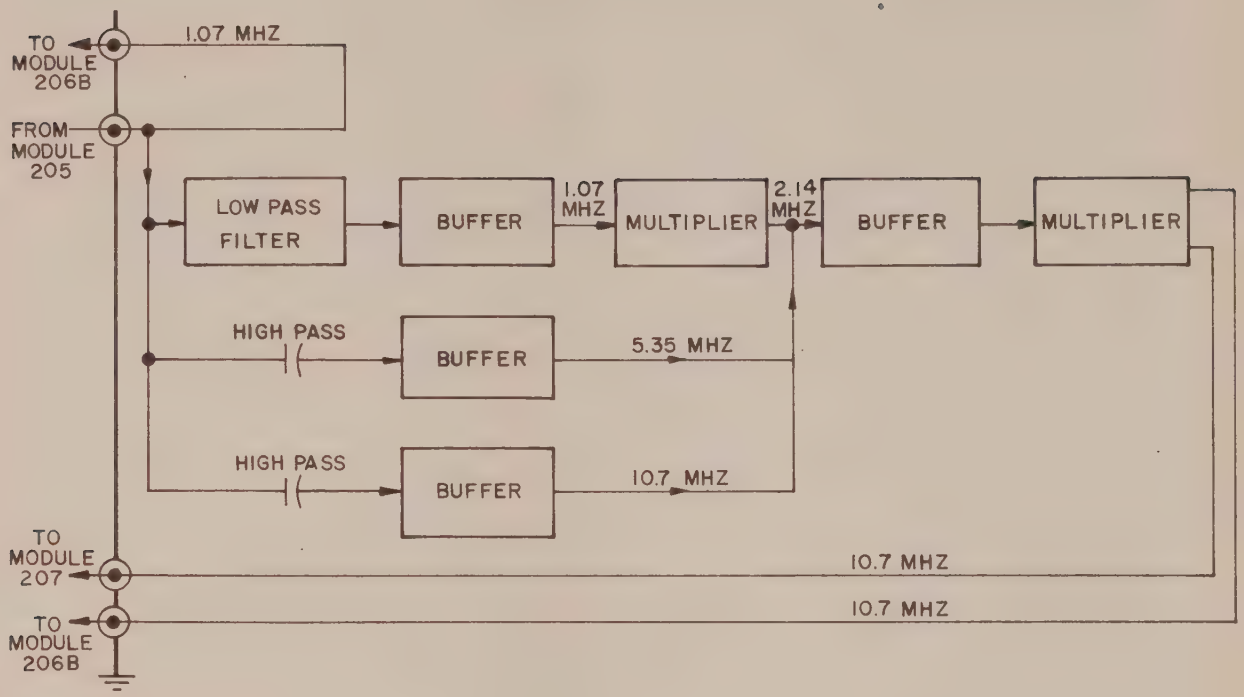


Figure 3-18. Marker Mixer Block Diagram

3-57. DISCRIMINATOR. (Module 206B.) (Refer to figure 3-19.)

3-58. Separate RF input signals feed a 10.7 MHz discriminator of 5% bandwidth and a 1.07 MHz discriminator of 25% bandwidth.

3-59. The 10.7 MHz discriminator input signal is maintained at a constant level by controlling the buffer supply in the marker converter module. The output is used in an AFC loop to control the Sweep Oscillator frequency CW and MOD modes; and in an AGC loop to maintain the ±22 1/2 KHz sweep oscillator deviation constant.

3-60. The 1.07 MHz discriminator input obtained directly from the marker converter for stabilizing the 455 KHz sweep channels center frequency and is electronically switched into an AFC loop by a control voltage obtained from the 455 KHz strip. This AFC loop by-passes the function switch push-buttons and therefore is inserted to provide control voltage.

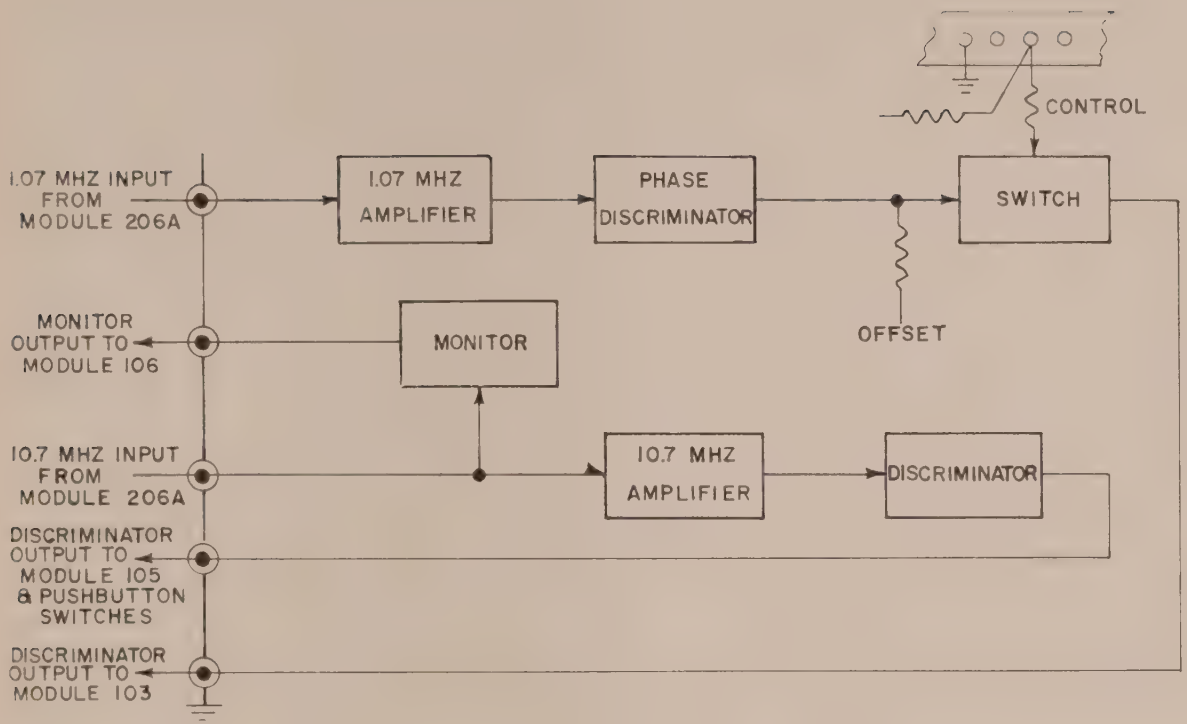


Figure 3-19. Discriminator Block Diagram

3-61. CRYSTAL FILTERS. (Module 207.) (Refer to figure 3-20.)

3-62. Three trigger pulses are obtained by detecting the envelope of the swept response of three crystal filters. The crystal filters are fed from a tuned buffer stage with two opposite phased outputs. A trimmer capacitor is used to balance out the crystal capacity. The pulse is amplified and detected again in a peak detector, and applied as an AGC bias through bootstrapped emitter-follower. A delay bias is applied to the AGC peak detector to prevent AGC action if the RF input is weak.

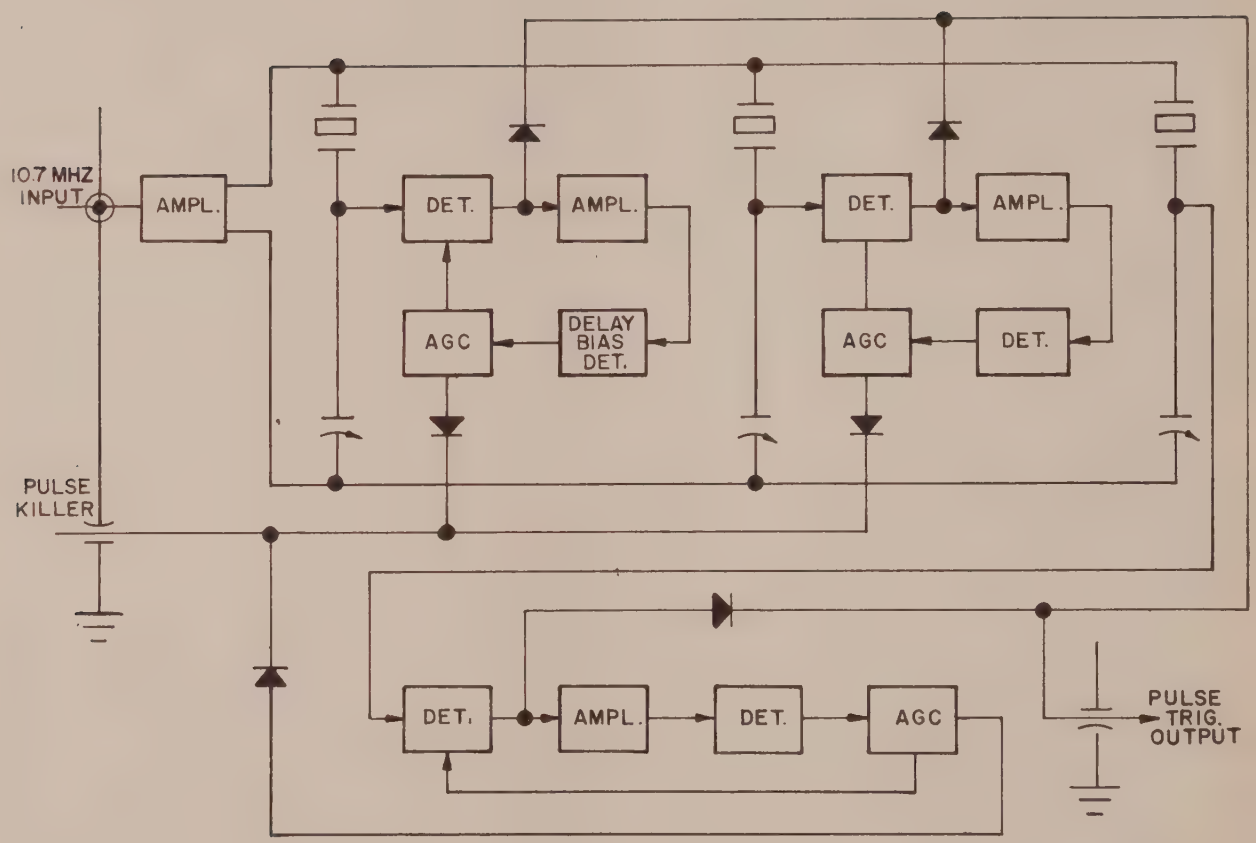


Figure 3-20. Crystal Filter Block Diagram

SECTION IV

SCHEMATIC DIAGRAMS

4-1. GENERAL.

4-2. This section provides the complete set of schematic diagrams required for maintenance of the SV-15A AM-FM SWEEP/SIGNAL GENERATOR.

4-3. The following schematics are included in this manual:

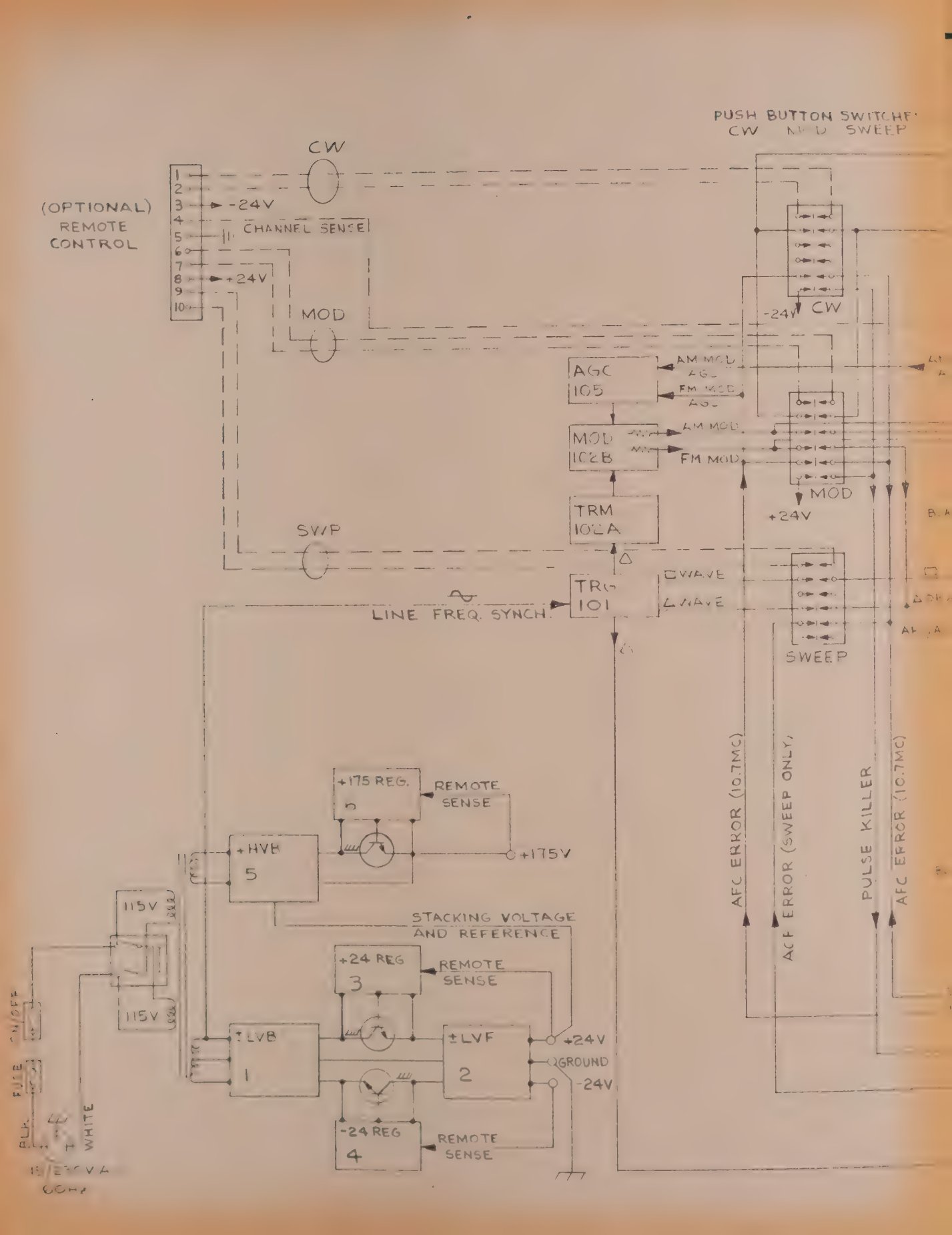
a.	SV-15A Block Diagram	SC007-0148
b.	Rectifier & Filter Module #1	SB007-0125
c.	Schematic Output Filter Module #2	SB007-0129
d.	+24V Power Supply Reg. Module #3	SB007-0131
e.	-24V Power Supply Module #4	SB007-0130
f.	+175V Rectifier & Output Filter Module #5	SB007-0132
g.	+175V Regulator Module #6	SC007-0133
h.	Square & Triangle Generator Module #101	SC007-0135
i.	Triangular Wave Multiplier Module #102A	SC007-0146
j.	480 Hz Source Module #102B	SC007-0145
k.	Sweep Drive Module #103	SB007-0126
l.	Shaper Module #104	SB007-0137
m.	400 Hz AGC Module #105	SC007-0138
n.	Marker Leveler Module #106	SB007-0136
p.	Output Leveler Module #107	SC007-0149
q.	Pulse Generator Module #108	SC007-0139
r.	Level/Meter Set-up Module #109	SB007-0134
s.	Channel Centering Module #110	SC007-0144
t.	Sweep Oscillator Module #201A	SC007-0140
u.	2X Multiplier (Sweep Osc.) Module #201B	SC007-0141
v.	Video Mixer Module #202	SC007-0143
w.	CW Oscillator Module #204	SB007-0135
x.	Marker Mixer Module #205	SC007-0142
y.	Multiplier Module #206A	SC007-0127
z.	Discriminator Module #206B	SC007-0128
aa.	Crystal Filter Module #207	SC007-0147

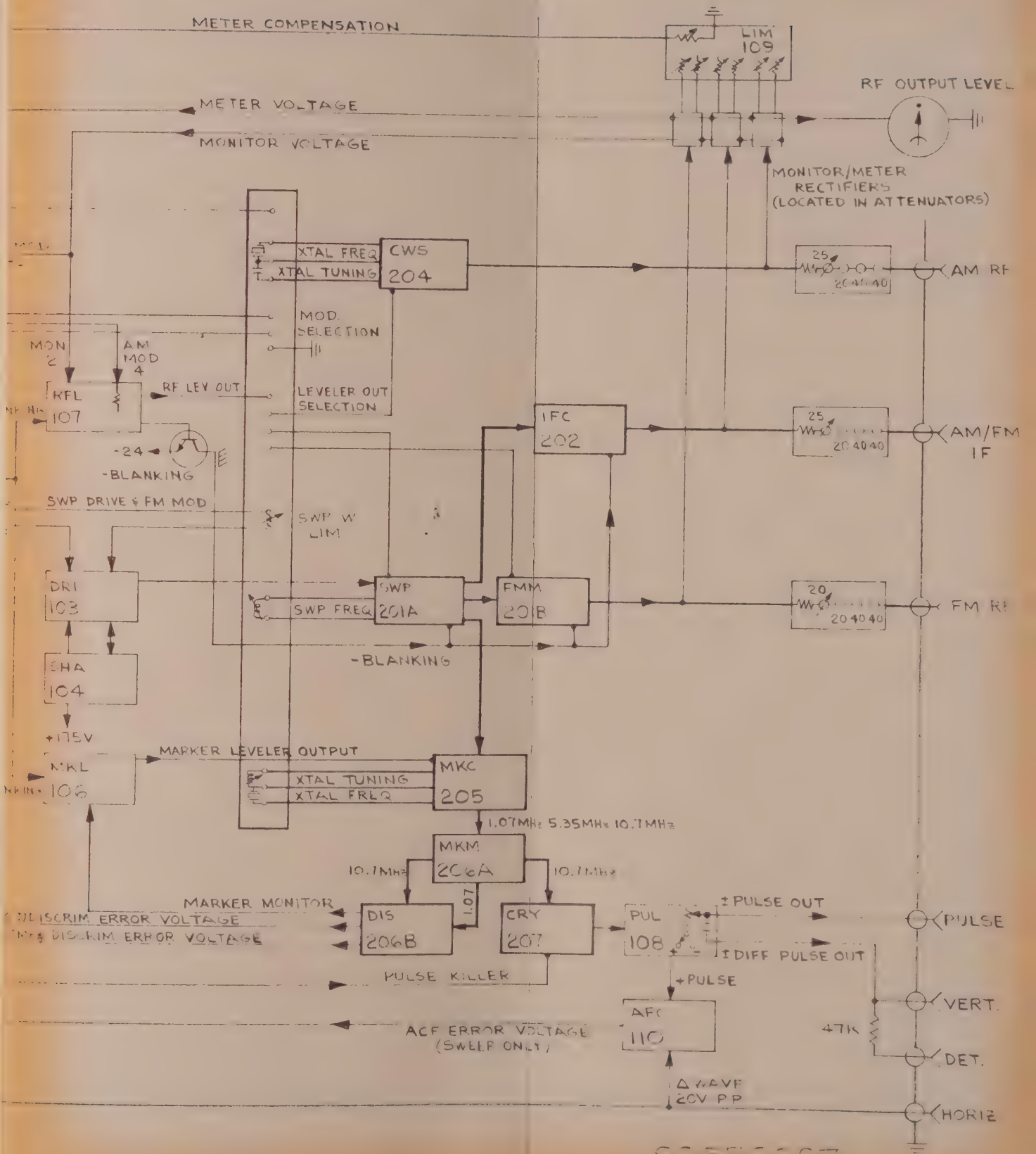
4-4. All resistors are 1/2 watt ±10% and are shown in ohms (Ω) unless otherwise specified.

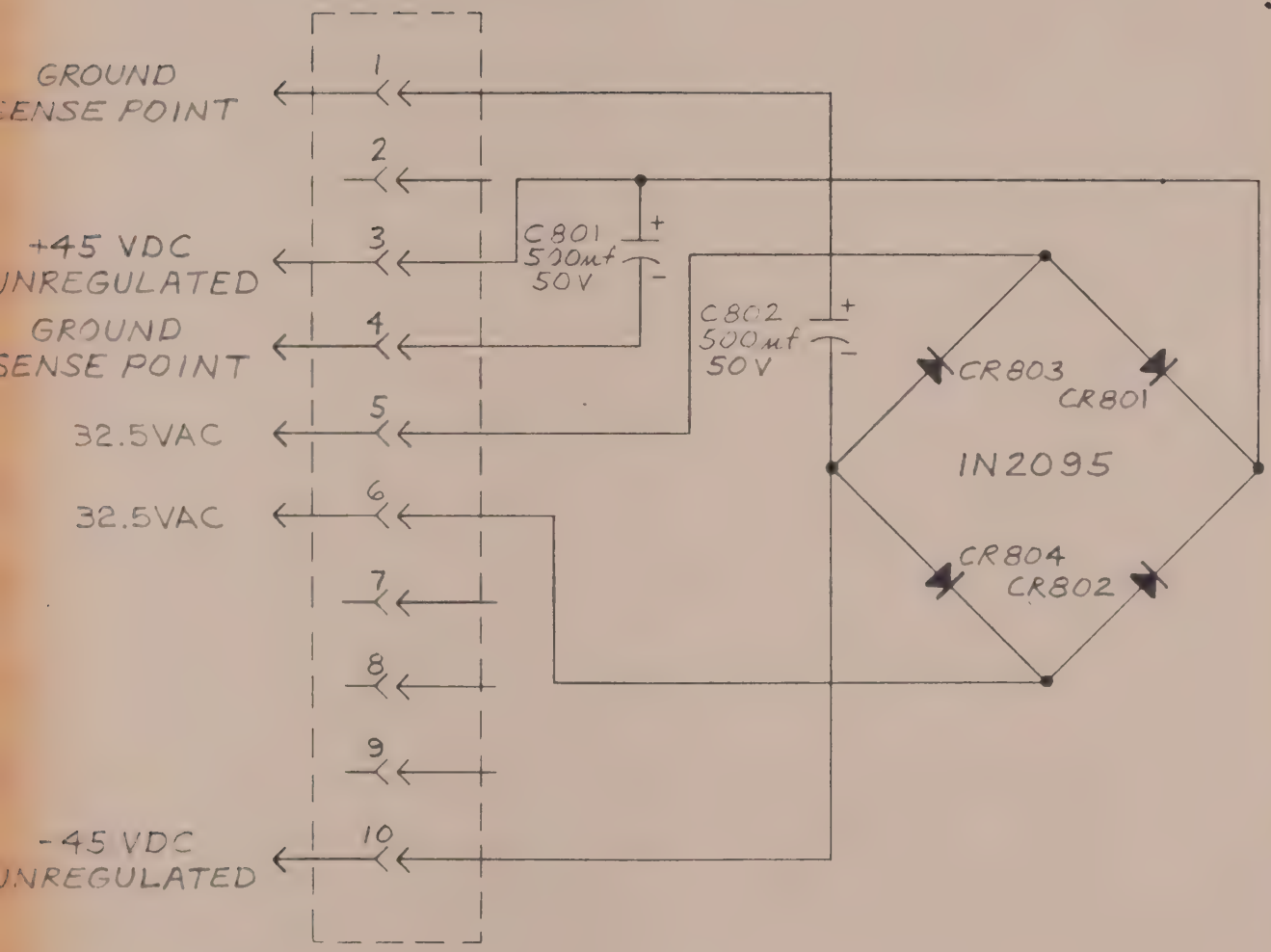
4-5. All capacitors are shown in picofarads (pf) unless otherwise specified.

4-6. All coils are shown in microhenries (μH) unless otherwise specified.

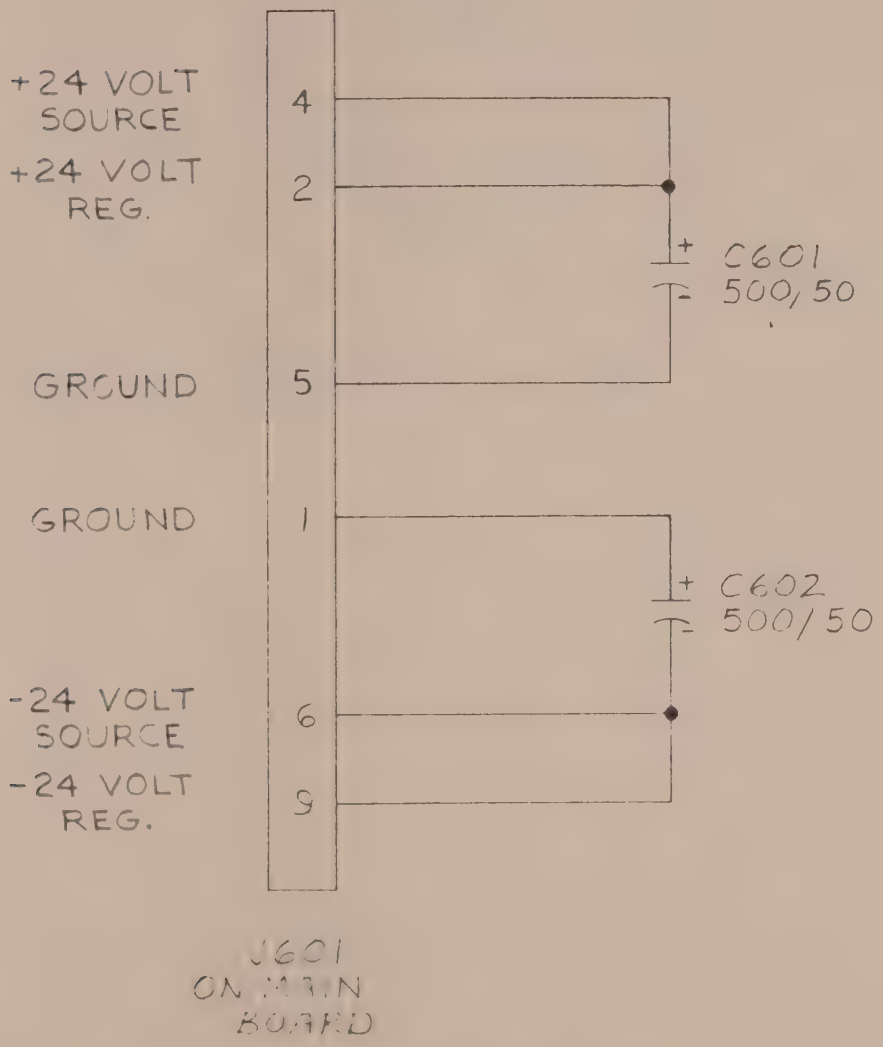
4-7. All starred values shown are subject to change.


PUSH BUTTON SWITCHES
CW
SWEEP
(OPTIONAL)
REMOTE
CONTROL
CW
-24V
CHANNEL SENSE
+24V
MOD
AGC
105
AM MOD AGC
FM MOD AGC
MOD
102B
AM MOD
FM MOD
TRM
102A
SWP
TRG
101
LINE FREQ. SYNCH.
SQUARE WAVE
SAWTOOTH WAVE
-24V
CW
MOD
+24V
SWEEP
AFC ERROR (10.7MC)
AFC ERROR (SWEEP ONLY)
PULSE KILLER
AFC ERROR (10.7MC)
+175 REG.
5
REMOTE SENSE
+HVB
5
+175V
115V
115V
STACKING VOLTAGE
AND REFERENCE
+24 REG
3
REMOTE SENSE
±LVB
1
±LVF
2
+24V
GROUND
-24V
-24 REG
4
REMOTE SENSE
FUSE
ON/OFF
BLK.
WHITE

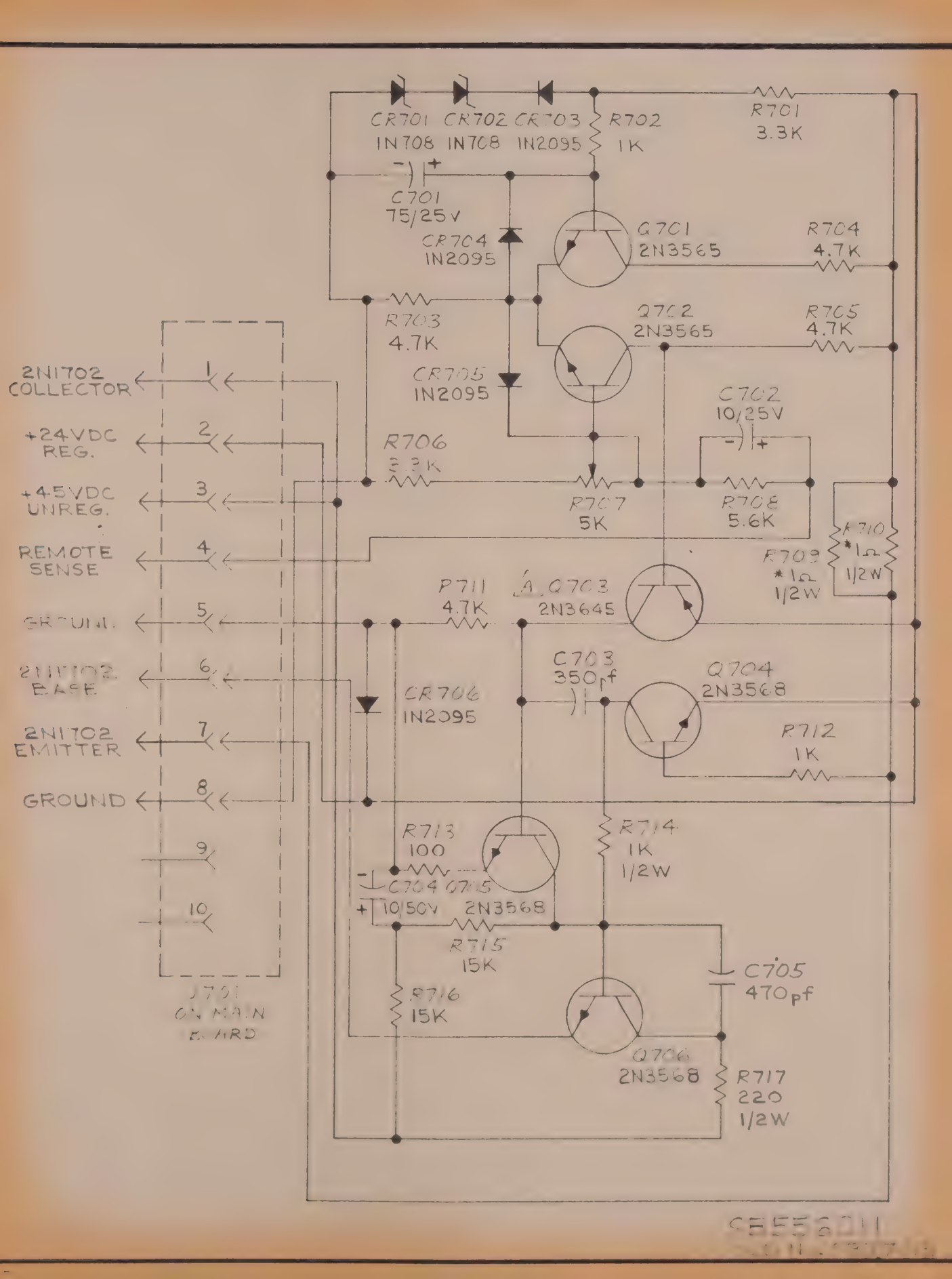

METER COMPENSATION
METER VOLTAGE
MONITOR VOLTAGE
LIM 109
RF OUTPUT LEVEL
MONITOR/METER RECTIFIERS (LOCATED IN ATTENUATORS)
XTAL FREQ
XTAL TUNING
CWS 204
MOD. SELECTION
LEVELER OUT SELECTION
AM MOD
RFL 107
RF LEV OUT
-24
-BLANKING
IFC 202
AM RF
AM/FM IF
FM RF
SWP DRIVE & FM MOD
SWP W LIM
DRI 103
SWP 201A
FMM 201B
SWP FREQ
-BLANKING
SHA 104
+175V
MARKER LEVELER OUTPUT
MKL 106
MKC 205
XTAL TUNING
XTAL FREQ
1.07MHz 5.35MHz 10.7MHz
MKM 206A
10.7MHz
10.7MHz
MARKER MONITOR
DIS 206B
1.07
CRY 207
PUL 108
+PULSE OUT
PULSE
-DIFF PULSE OUT
PULSE KILLER
+PULSE
AFC 110
ACF ERROR VOLTAGE (SWEEP ONLY)
47K
VERT.
DET.
Δ WAVE 20V P-P
HORIZ

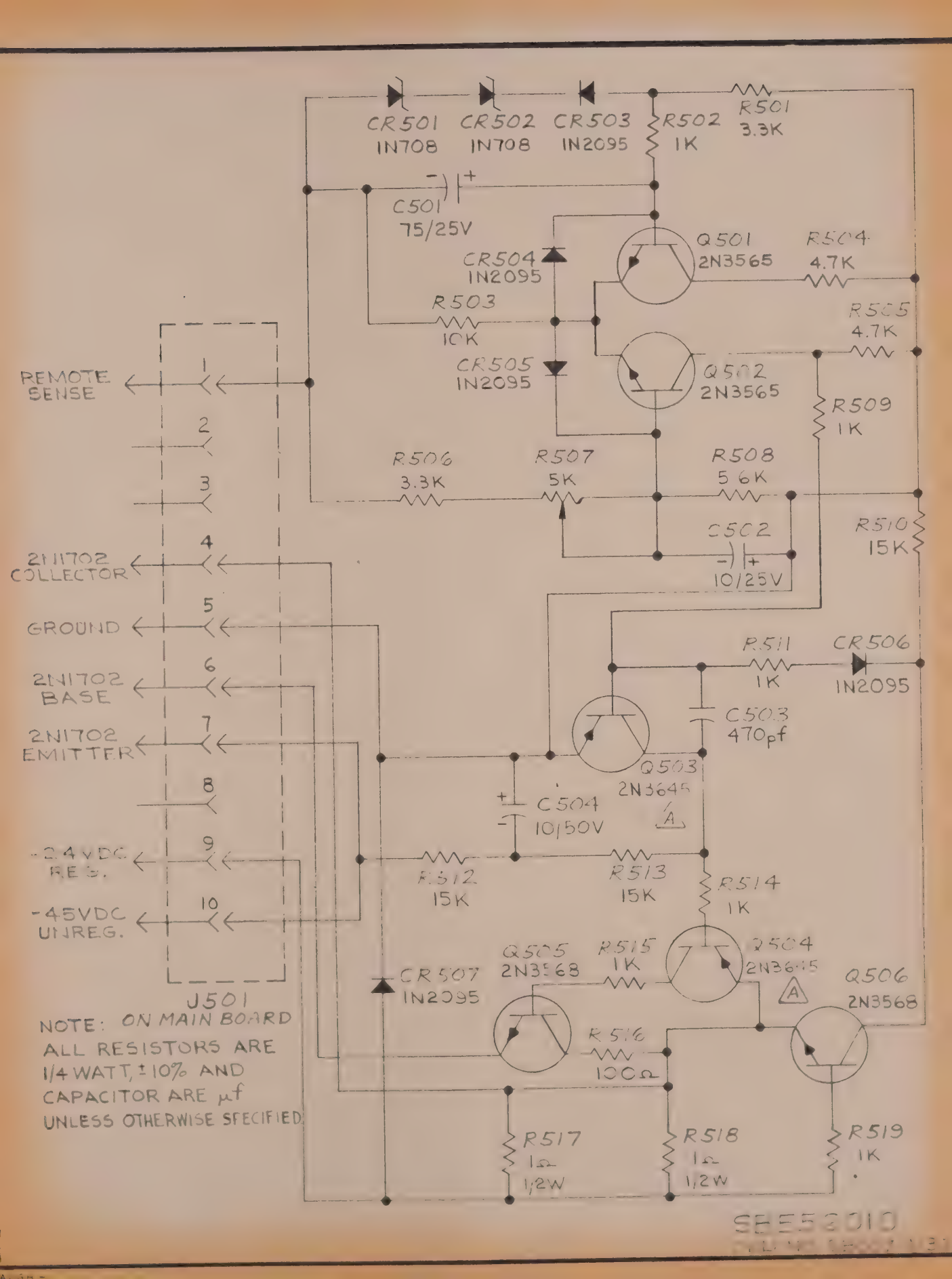

GROUND
SENSE POINT
+45 VDC
UNREGULATED
GROUND
SENSE POINT
32.5VAC
32.5VAC
-45 VDC
UNREGULATED
1
2
3
4
5
6
7
8
9
10
C801
500uf
50V
C802
500uf
50V
CR803
CR801
IN2095
CR804
CR802

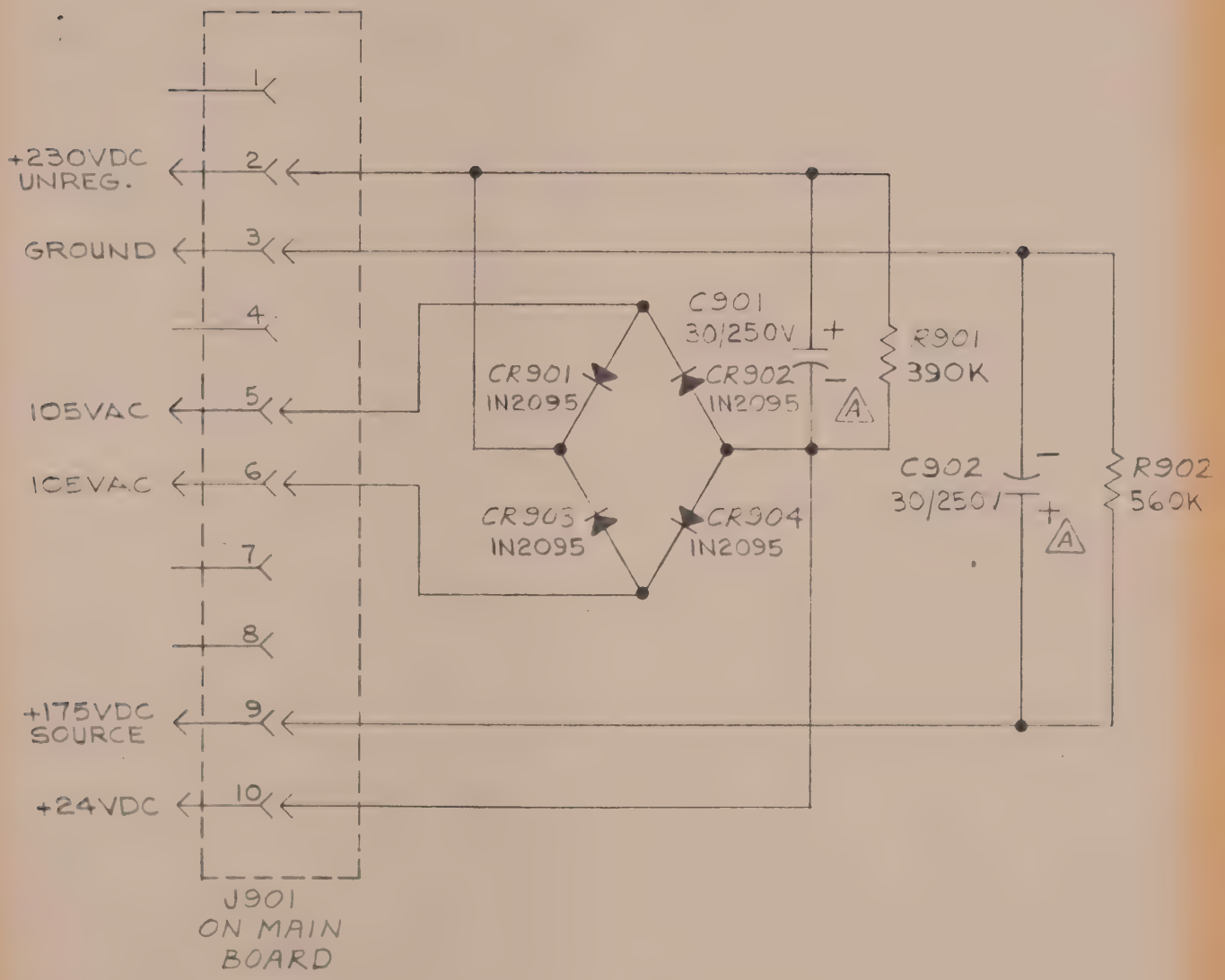
SB556005


+24 VOLT SOURCE
+24 VOLT REG.
GROUND
GROUND
-24 VOLT SOURCE
-24 VOLT REG.
4
2
5
1
6
9
+
-
C601
500/50
+
-
C602
500/50
J601
ON MAIN
BOARD

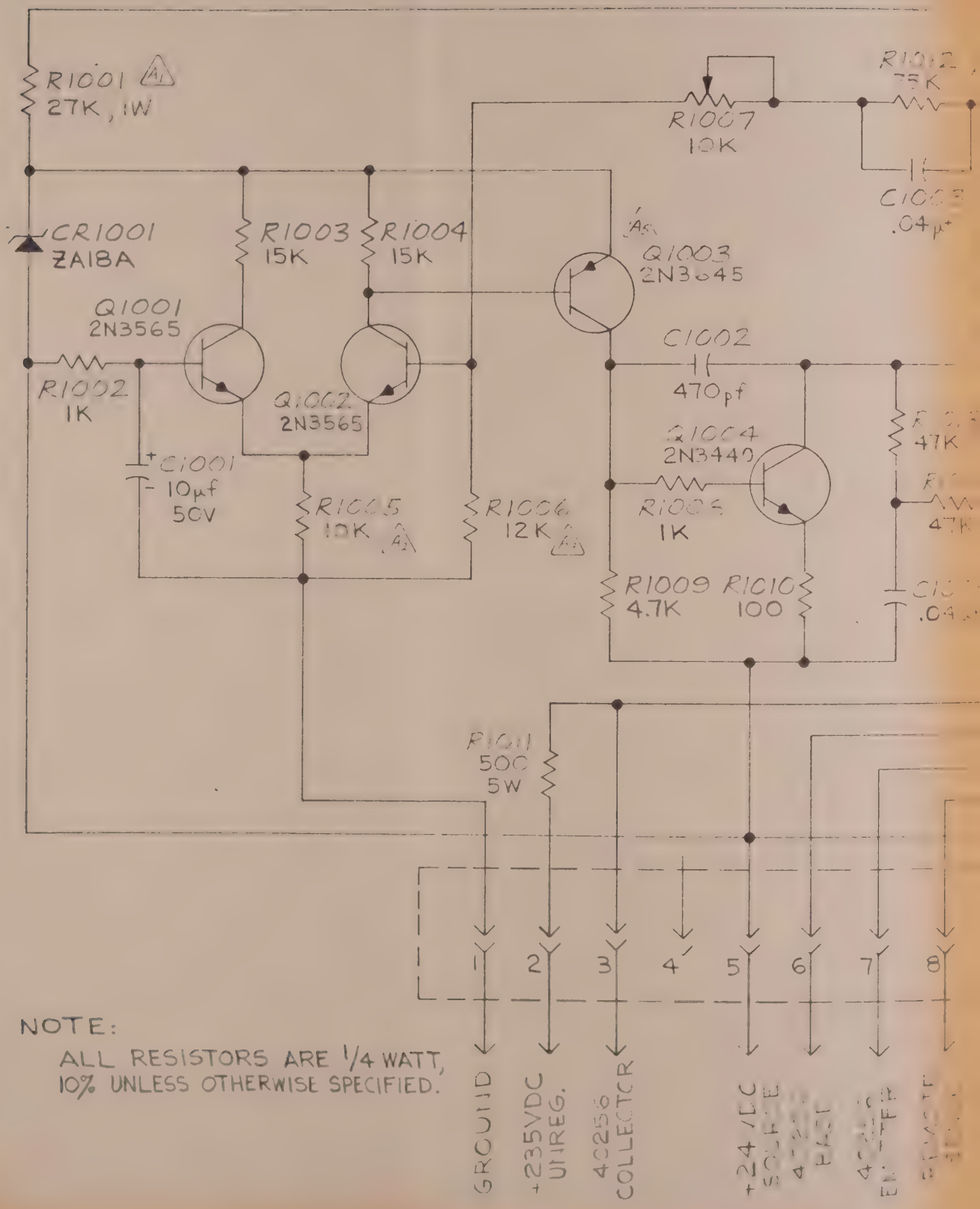
SB556009


CR701 IN708
CR702 IN708
CR703 IN2095
R702 1K
R701 3.3K
C701 75/25V
CR704 IN2095
Q701 2N3565
R704 4.7K
R703 4.7K
Q702 2N3565
R705 4.7K
CR705 IN2095
C702 10/25V
R706 3.3K
R707 5K
R708 5.6K
R710 *1Ω 1/2W
R709 *1Ω 1/2W
R711 4.7K
Q703 2N3645
C703 350pf
Q704 2N3568
CR706 IN2095
R712 1K
R713 100
C704 10/50V
Q705 2N3568
R714 1K 1/2W
R715 15K
R716 15K
C705 470pf
Q706 2N3568
R717 220 1/2W
2N1702 COLLECTOR
+24VDC REG.
+45VDC UNREG.
REMOTE SENSE
GROUND
2N1702 BASE
2N1702 EMITTER
GROUND
J701 ON MAIN BOARD


CR501 IN708
CR502 IN708
CR503 IN2095
R502 1K
R501 3.3K
C501 75/25V
CR504 IN2095
Q501 2N3565
R504 4.7K
R503 10K
R505 4.7K
CR505 IN2095
Q502 2N3565
R509 1K
REMOTE SENSE
1
2
3
R506 3.3K
R507 5K
R508 5.6K
C502 10/25V
R510 15K
2N1702 COLLECTOR
4
GROUND
5
2N1702 BASE
6
2N1702 EMITTER
7
8
R511 1K
CR506 IN2095
C503 470pf
Q503 2N3645
C504 10/50V
-24VDC REG.
9
-45VDC UNREG.
10
R512 15K
R513 15K
R514 1K
Q505 2N3568
R515 1K
Q504 2N3645
CR507 IN2095
Q506 2N3568
R516 100Ω
R517 1Ω 1/2W
R518 1Ω 1/2W
R519 1K
J501
NOTE: ON MAIN BOARD
ALL RESISTORS ARE 1/4 WATT, ±10% AND CAPACITOR ARE μf UNLESS OTHERWISE SPECIFIED.

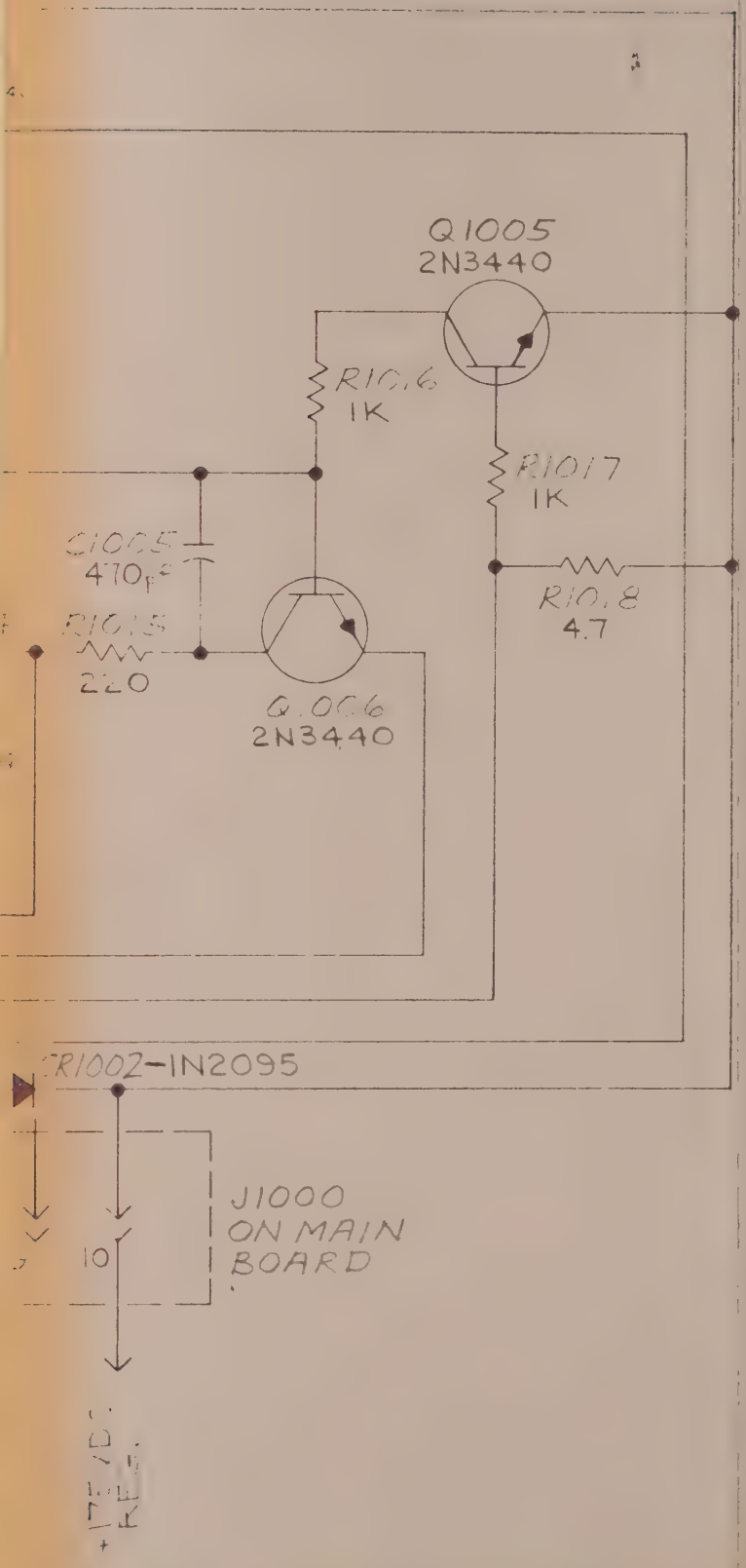

1
+230VDC UNREG.
2
GROUND
3
4
105VAC
5
106VAC
6
7
8
+175VDC SOURCE
9
+24VDC
10
J901 ON MAIN BOARD
C901 30/250V
+
CR901 IN2095
CR902 IN2095
−
A
R901 390K
CR903 IN2095
CR904 IN2095
C902 30/250V
−
+
A
R902 560K

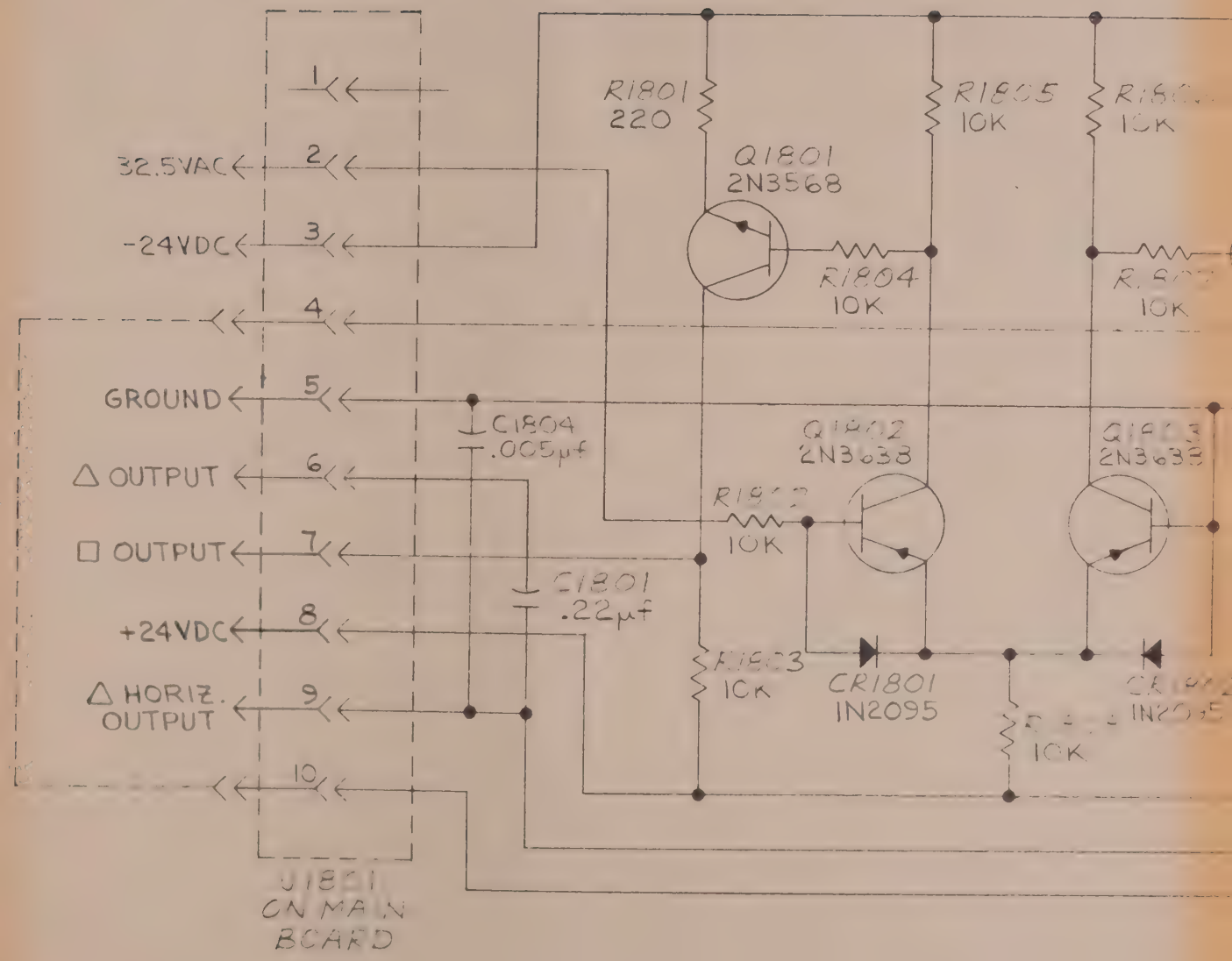
SRE56012

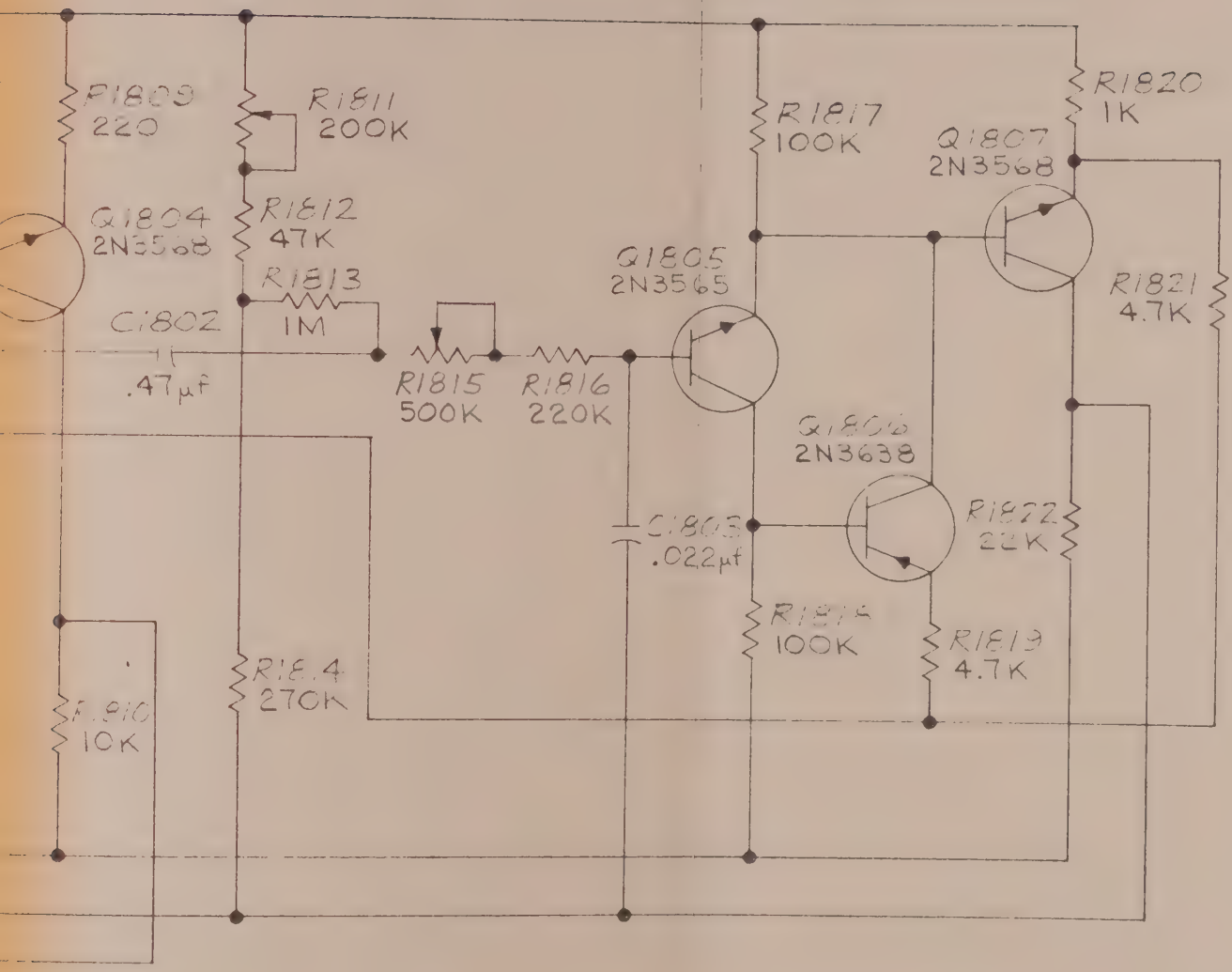


NOTE:

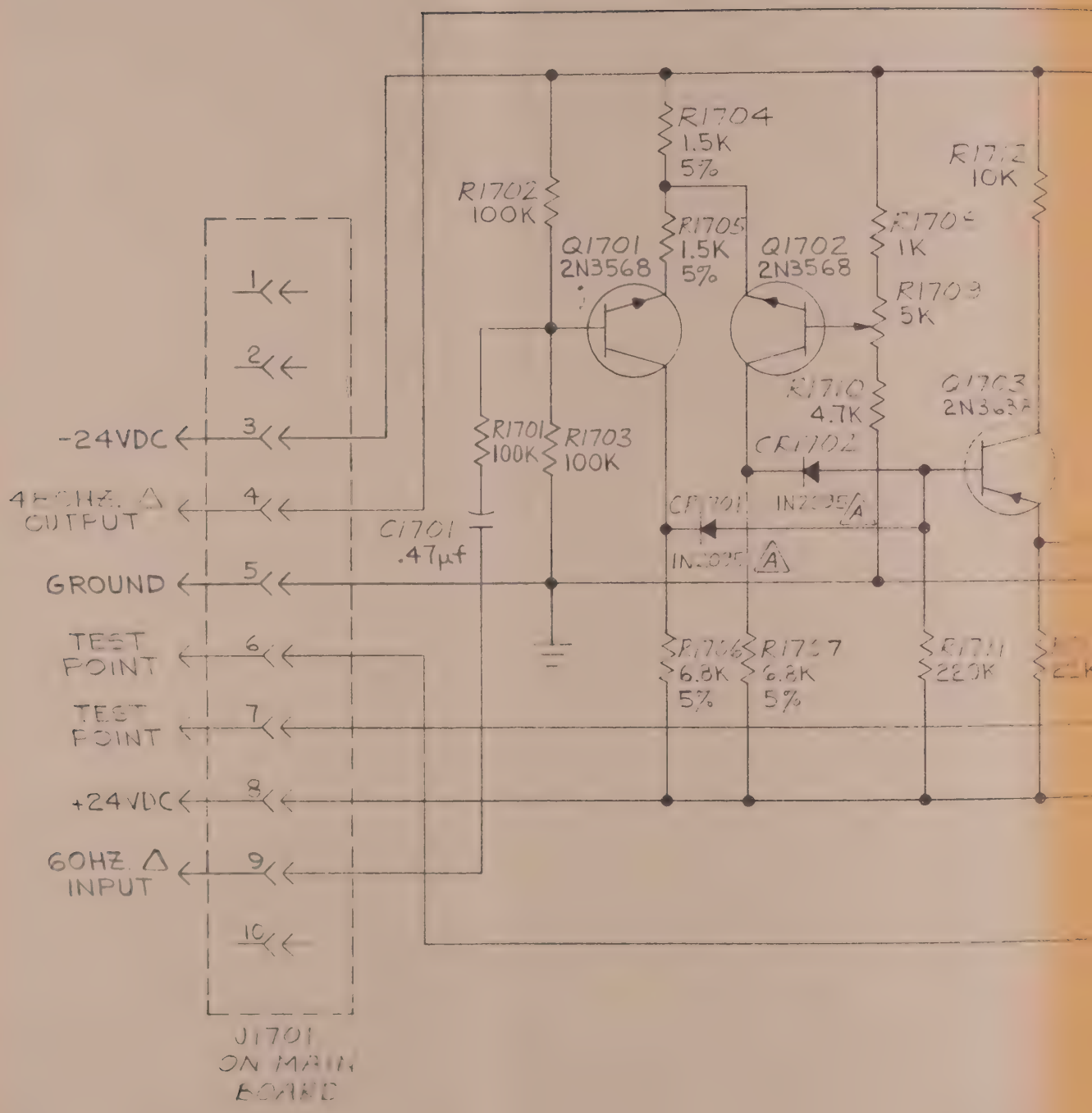
ALL RESISTORS ARE 1/4 WATT, 10% UNLESS OTHERWISE SPECIFIED.


Q1005
2N3440
R1016
1K
R1017
1K
C1005
470pF
R1018
4.7
R1015
220
Q1006
2N3440
CR1002-IN2095
J1000
ON MAIN
BOARD
10


1
32.5VAC
2
-24VDC
3
4
GROUND
5
△ OUTPUT
6
□ OUTPUT
7
+24VDC
8
△ HORIZ. OUTPUT
9
10
J1801 ON MAIN BOARD
R1801 220
Q1801 2N3568
R1804 10K
R1805 10K
C1804 .005μf
C1801 .22μf
R1803 10K
CR1801 IN2095
10K
2N3638
2N3638
10K

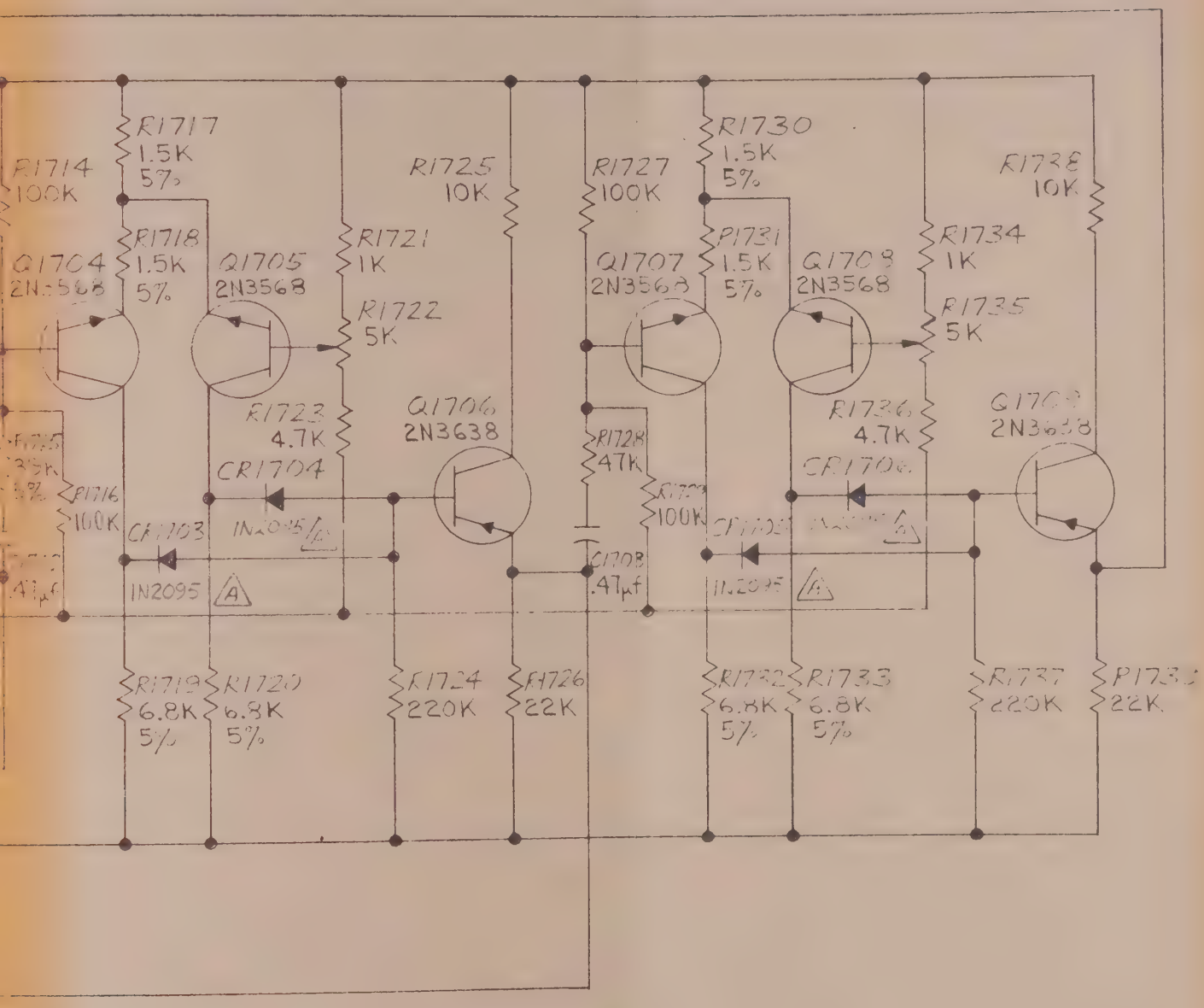

R1809
220
R1811
200K
R1817
100K
R1820
1K
Q1807
2N3568
Q1804
2N3568
R1812
47K
R1813
1M
Q1805
2N3565
R1821
4.7K
C1802
.47μf
R1815
500K
R1816
220K
Q1806
2N3638
C1803
.022μf
R1822
22K
R1814
100K
R1813
4.7K
R1814
270K
R1810
10K

SC55-5015

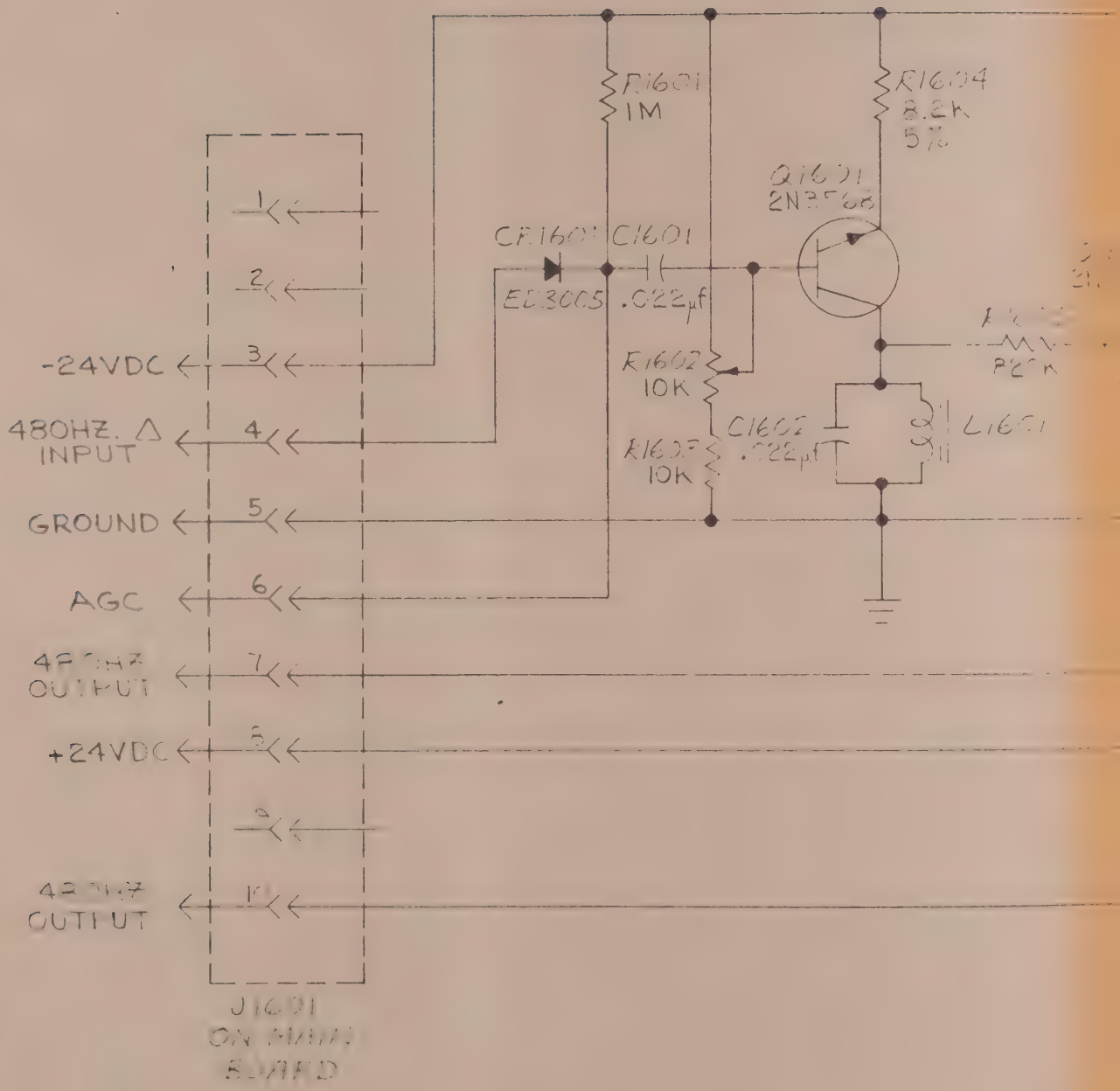


NOTE:

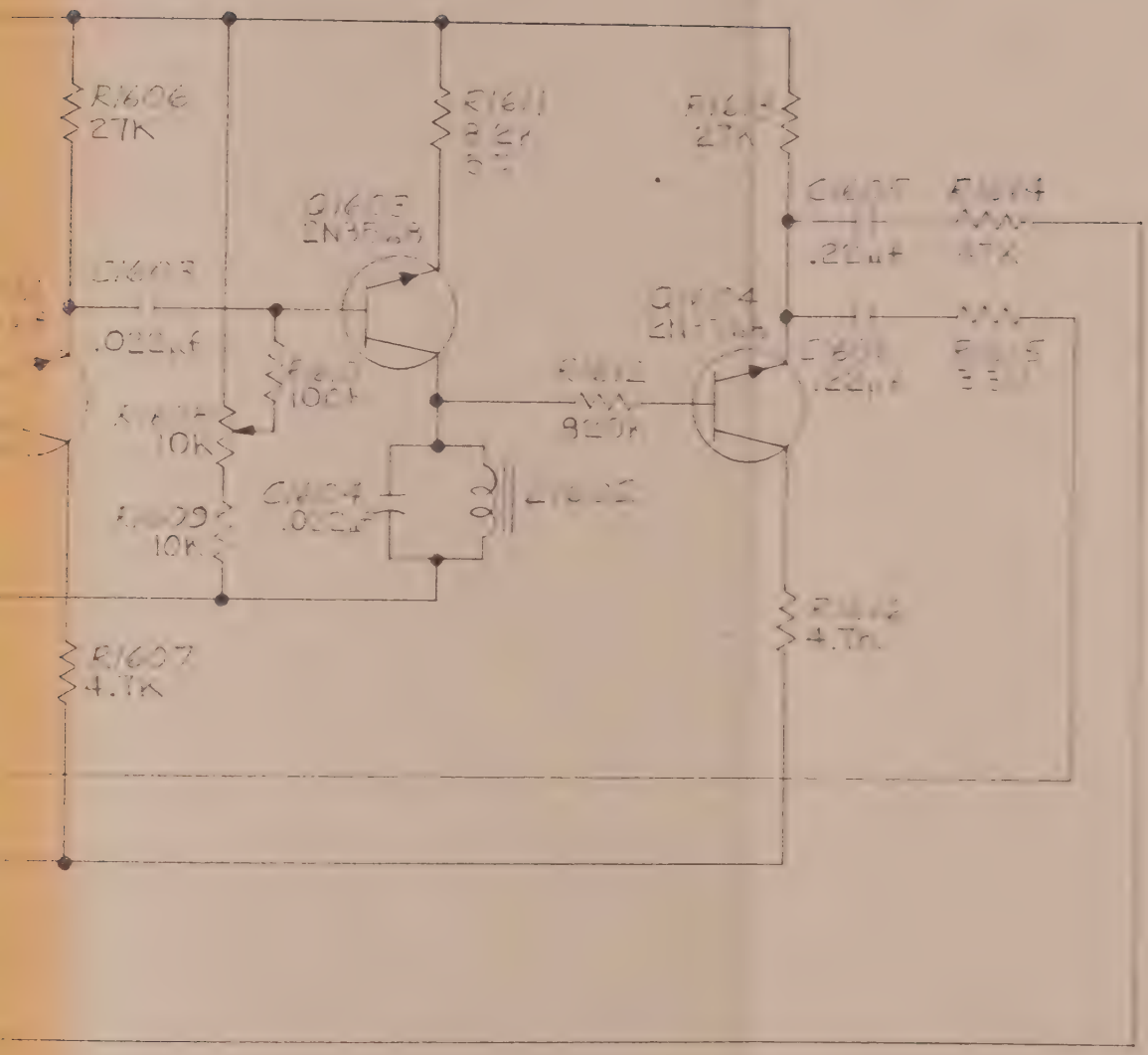
ALL RESISTOR
UNLESS OTHE



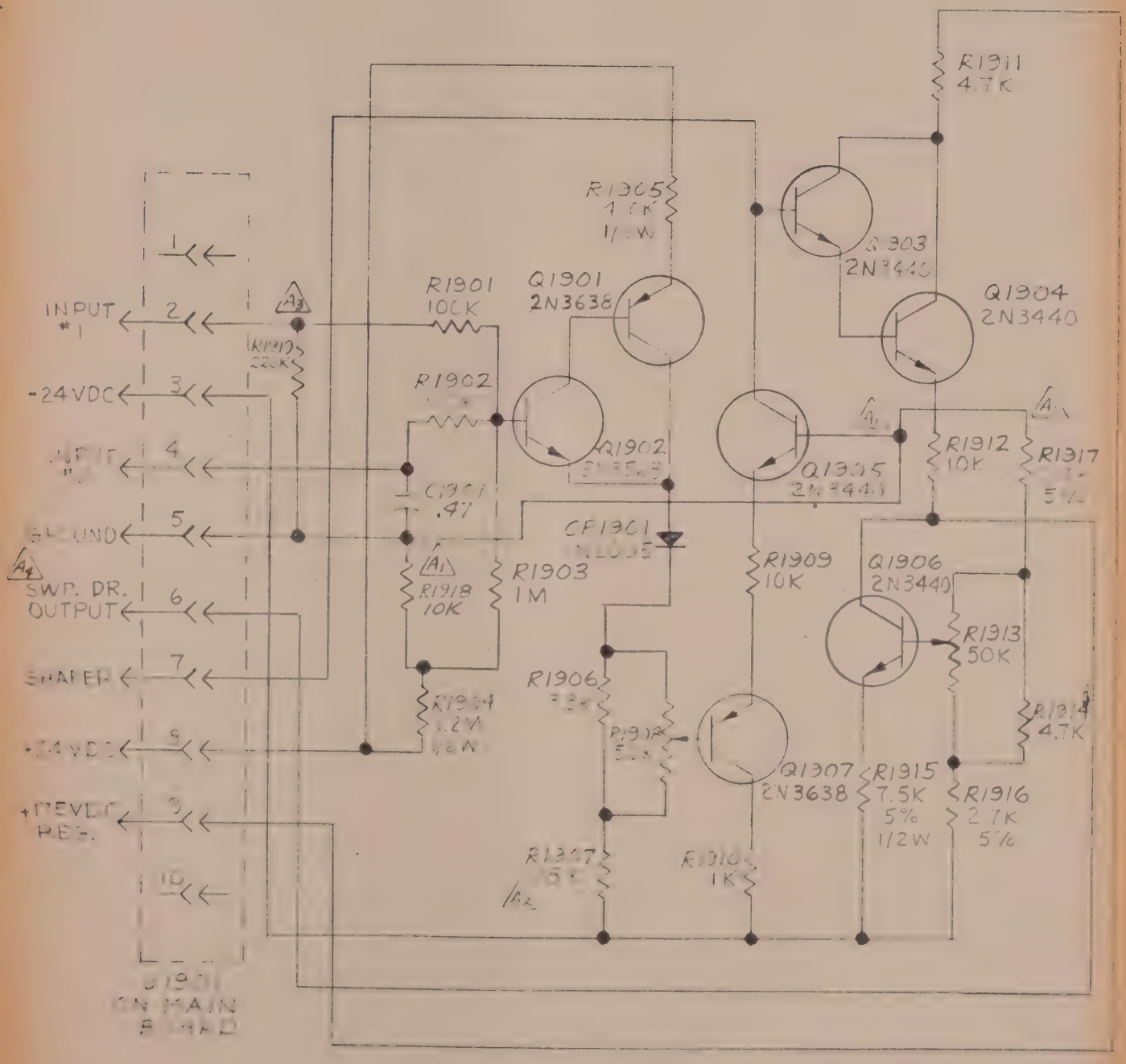
ARE 1/4 WATT, 10%
E SPECIFIED.



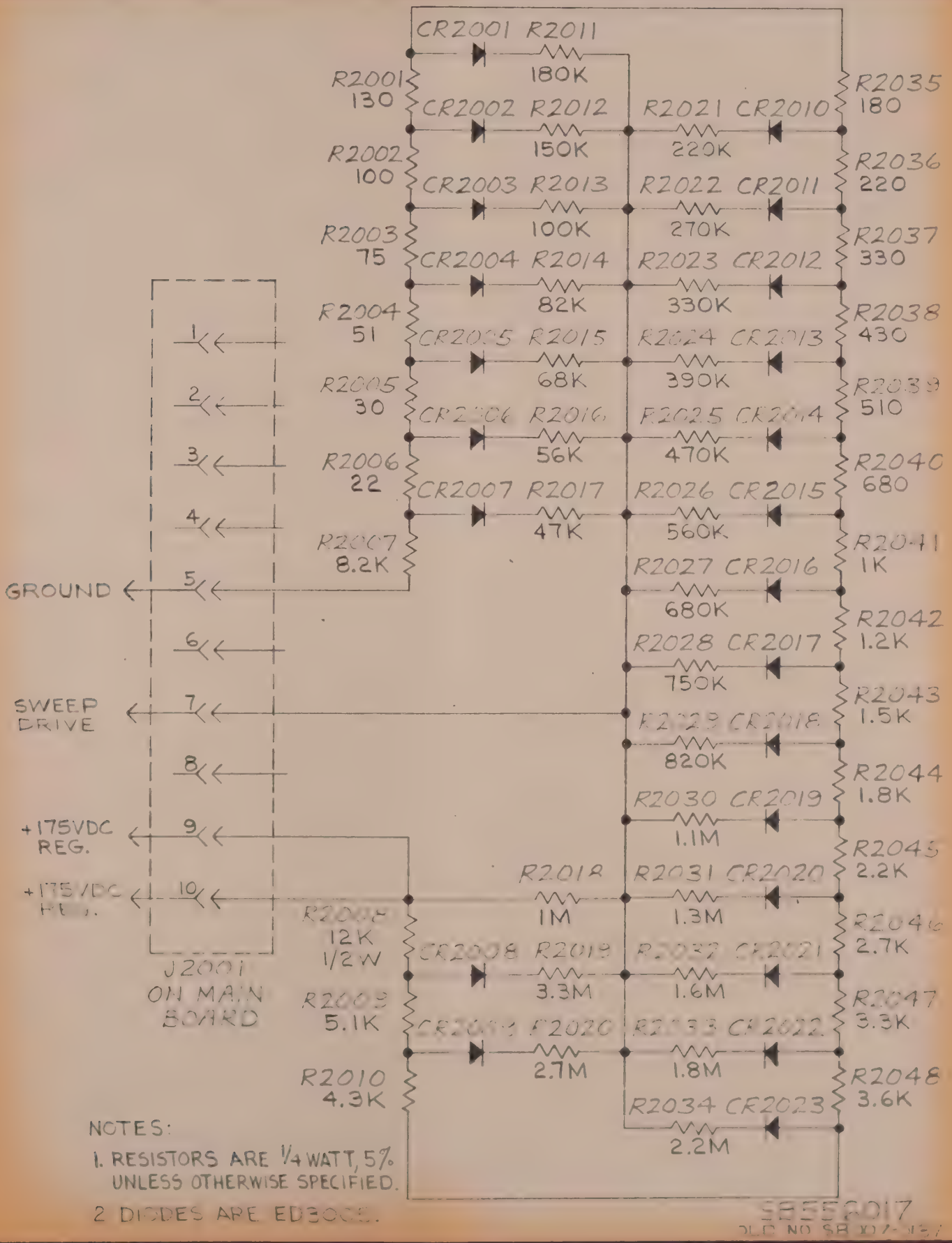
NOTE:
ALL RESISTO
UNLESS OTHE



ARE 1/4 WATT, 10%
NE SPECIFIED.


R1911
4.7K
R1905
1K
1/2W
Q1903
2N3440
Q1904
2N3440
R1901
10CK
Q1901
2N3638
INPUT
#1
-24VDC
R1902
Q1902
Q1905
2N3440
R1912
10K
R1917
5%
C1901
.47
CR1901
R1909
10K
Q1906
2N3440
SWP. DR.
OUTPUT
R1918
10K
R1903
1M
R1913
50K
R1906
R1914
4.7K
Q1907
2N3638
R1915
7.5K
5%
1/2W
R1916
2.7K
5%
R1907
R1910
1K
NOTE:
ALL RESISTORS ARE 1/4 WATT ±10%
UNLESS OTHERWISE SPECIFIED.

SB556006

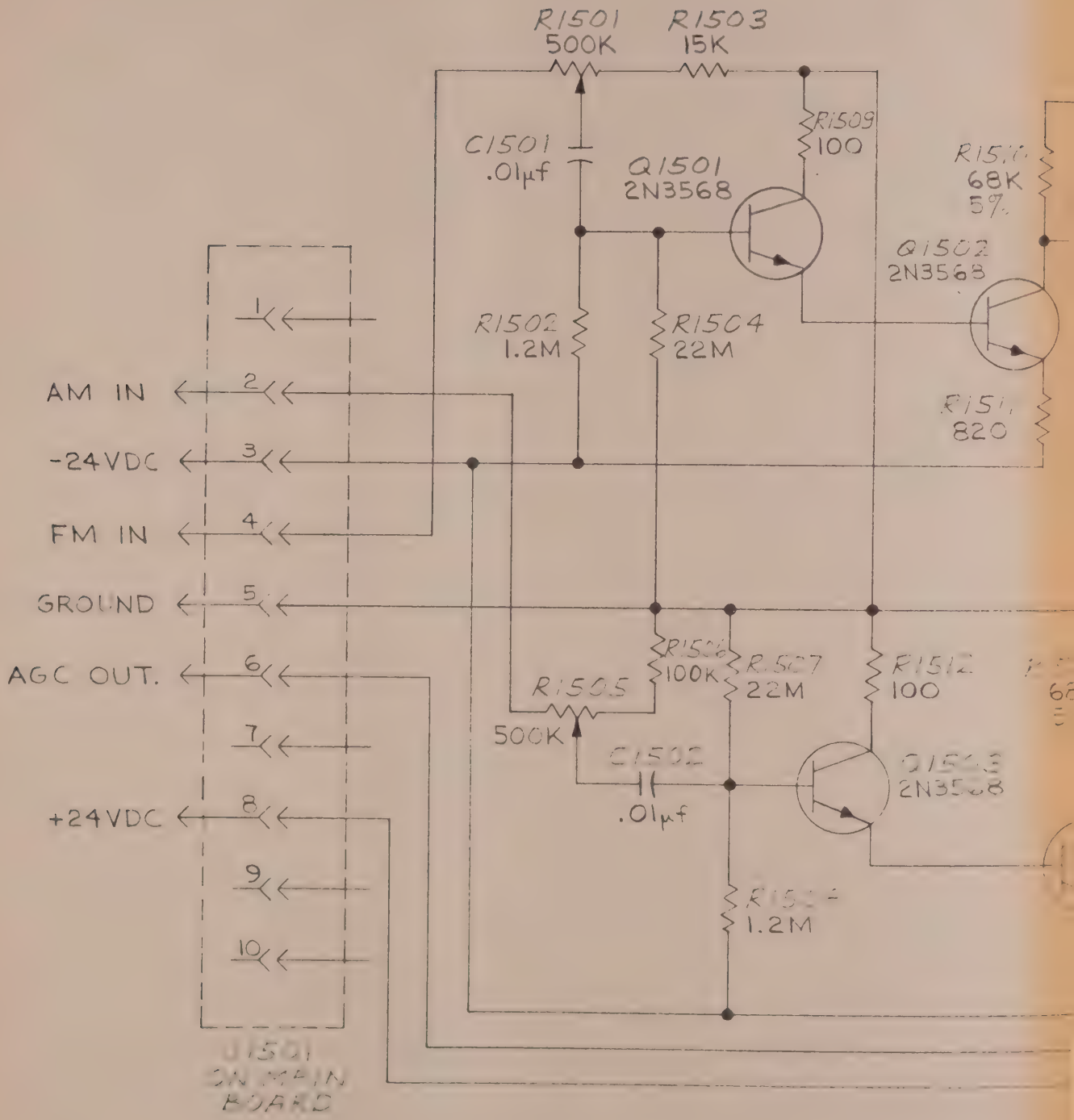


NOTES:

1. RESISTORS ARE 1/4 WATT, 5% UNLESS OTHERWISE SPECIFIED.
2. DIODES ARE ED3006.

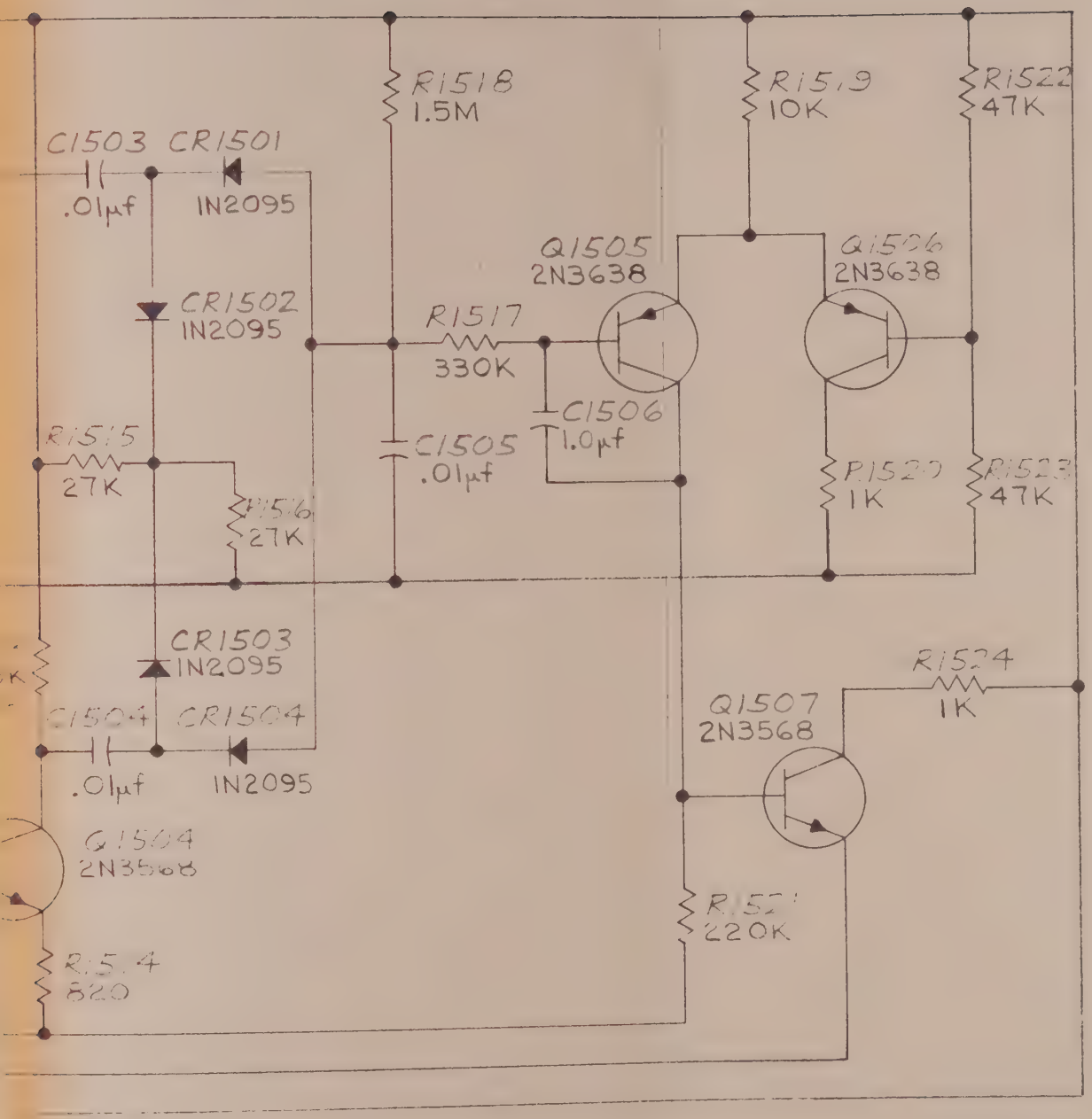
SB552017

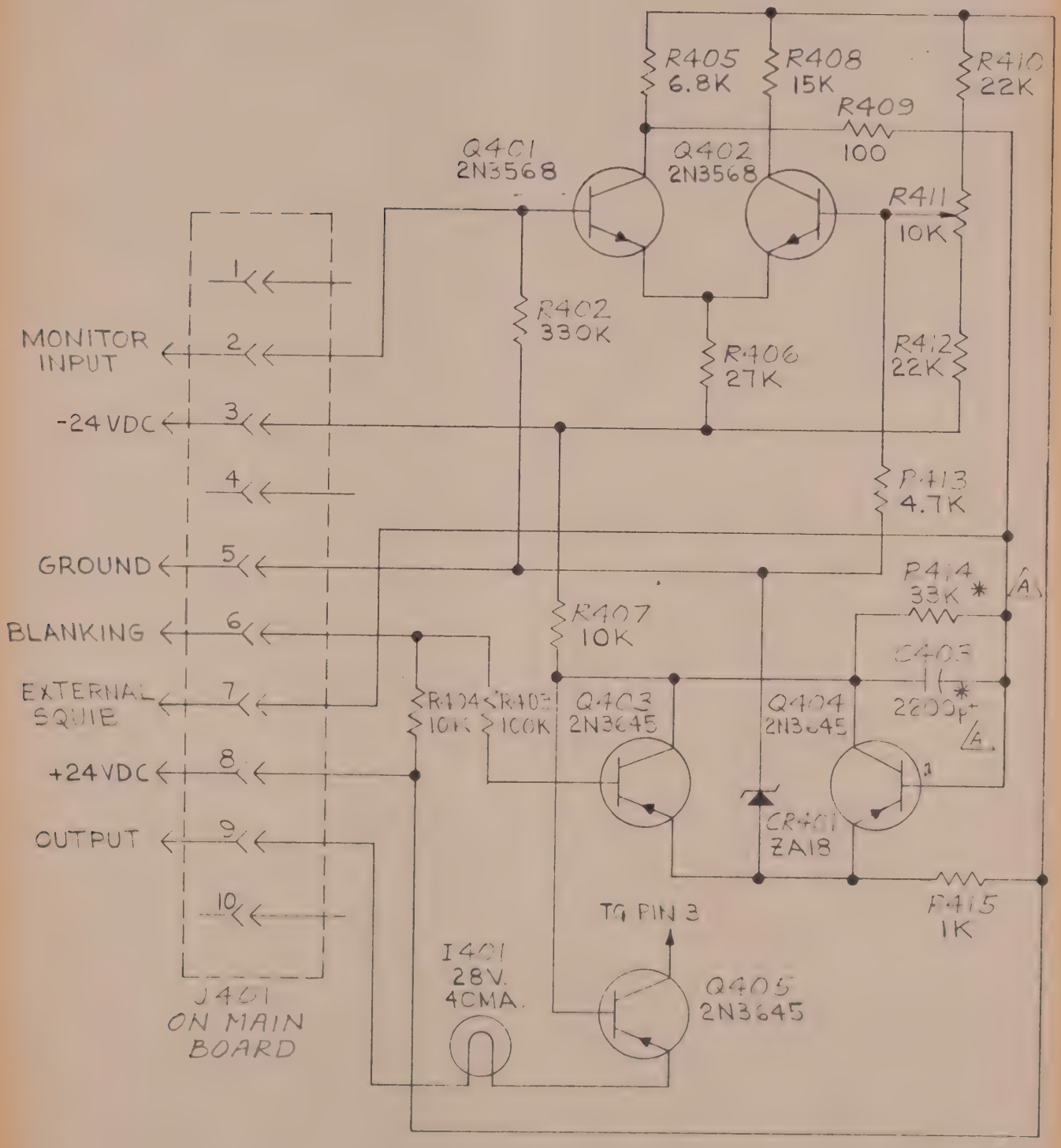
DLC NO SB X07-1371



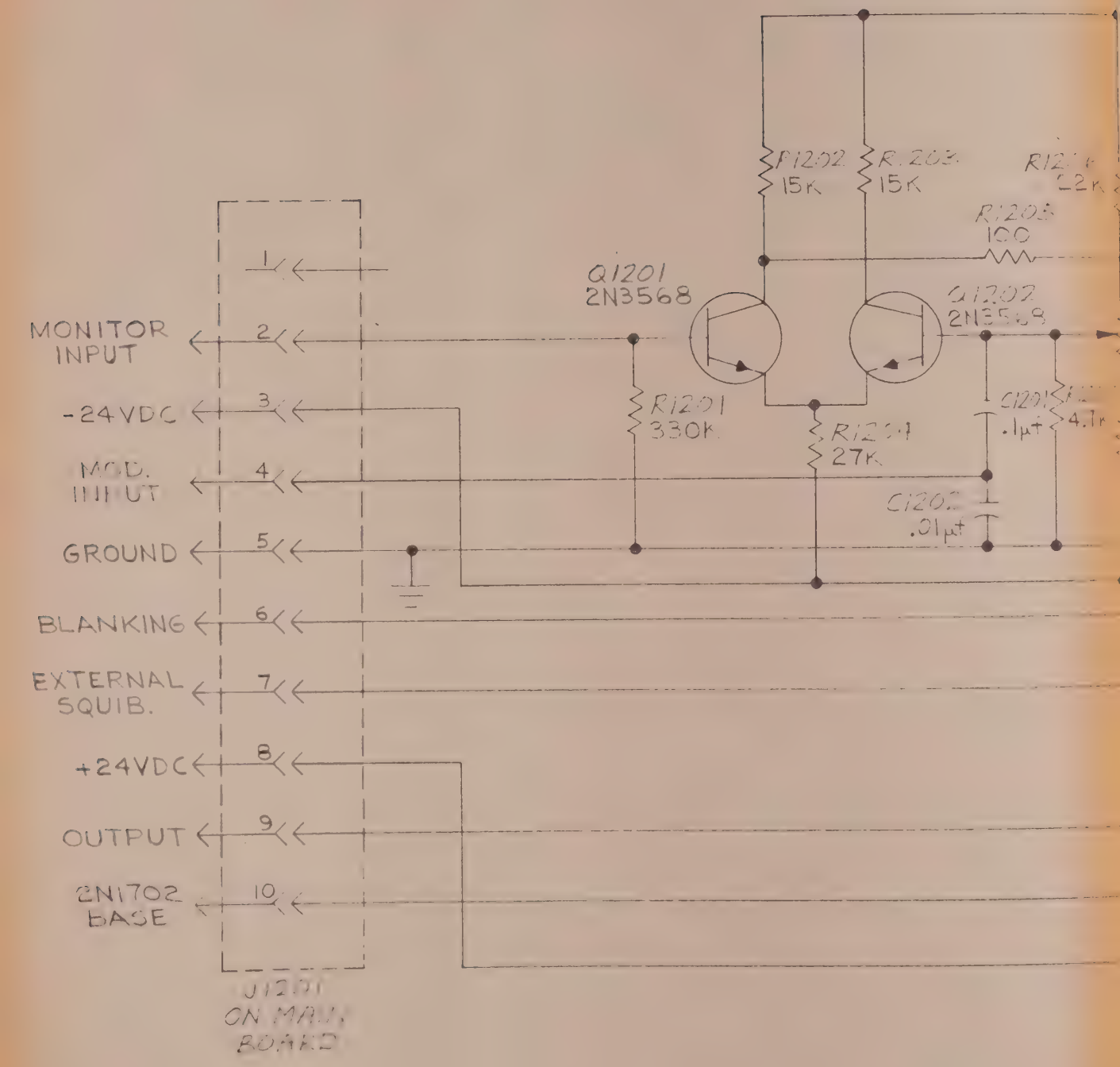
NOTE:

ALL RESISTORS ARE 1/4 WATT, 10%
UNLESS OTHERWISE SPECIFIED


R1518
1.5M
R1519
10K
R1522
47K
C1503
.01μf
CR1501
IN2095
Q1505
2N3638
Q1506
2N3638
CR1502
IN2095
R1517
330K
C1506
1.0μf
C1505
.01μf
R1515
27K
R1516
27K
R1520
1K
R1523
47K
CR1503
IN2095
R1524
1K
Q1507
2N3568
C1504
.01μf
CR1504
IN2095
Q1504
2N3568
R1521
220K
R1514
820

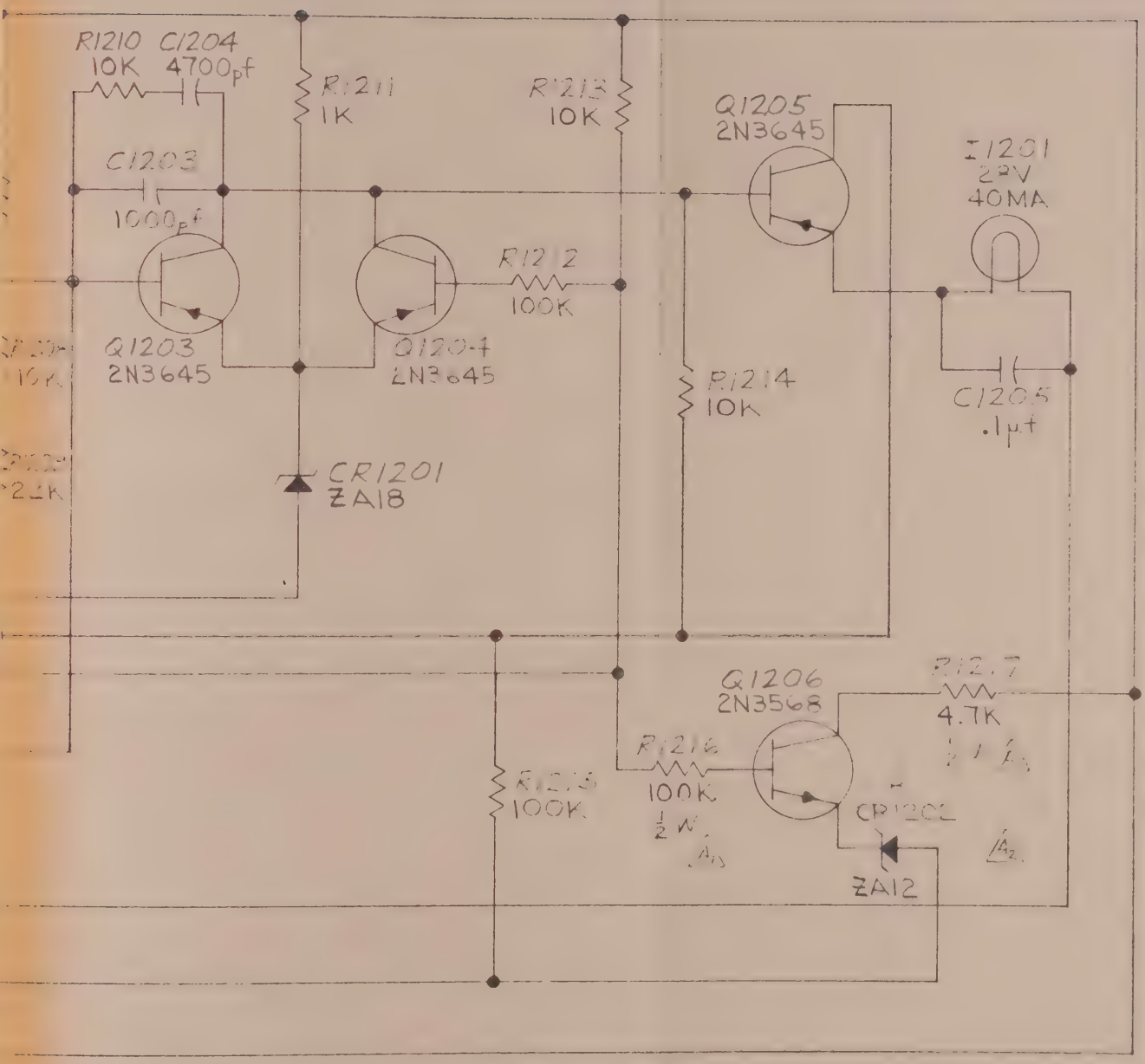

R405
6.8K
R408
15K
R410
22K
R409
100
Q401
2N3568
Q402
2N3568
R411
10K
R402
330K
R406
27K
R412
22K
MONITOR
INPUT
-24 VDC
R413
4.7K
GROUND
R414
33K *
A
R407
10K
BLANKING
C403
EXTERNAL
SQUIE
R404
10K
R405
100K
Q403
2N3645
Q404
2N3645
2200pf *
A
+24VDC
CR401
ZA18
OUTPUT
R415
1K
TO PIN 3
I401
28V.
40MA.
Q405
2N3645
J401
ON MAIN
BOARD

SB556016

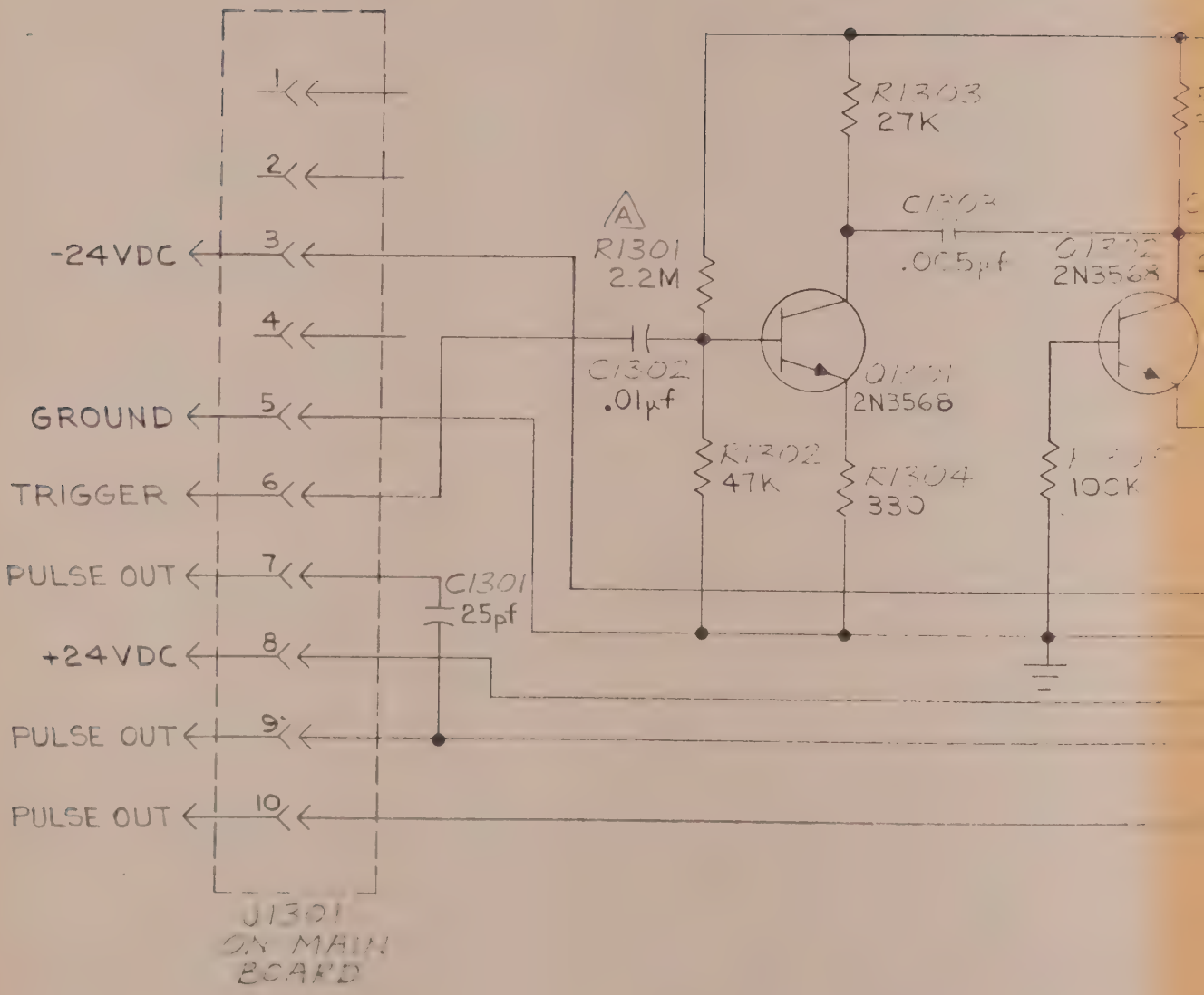


NOTE:

ALL RESISTORS AR
UNLESS OTHERWISE

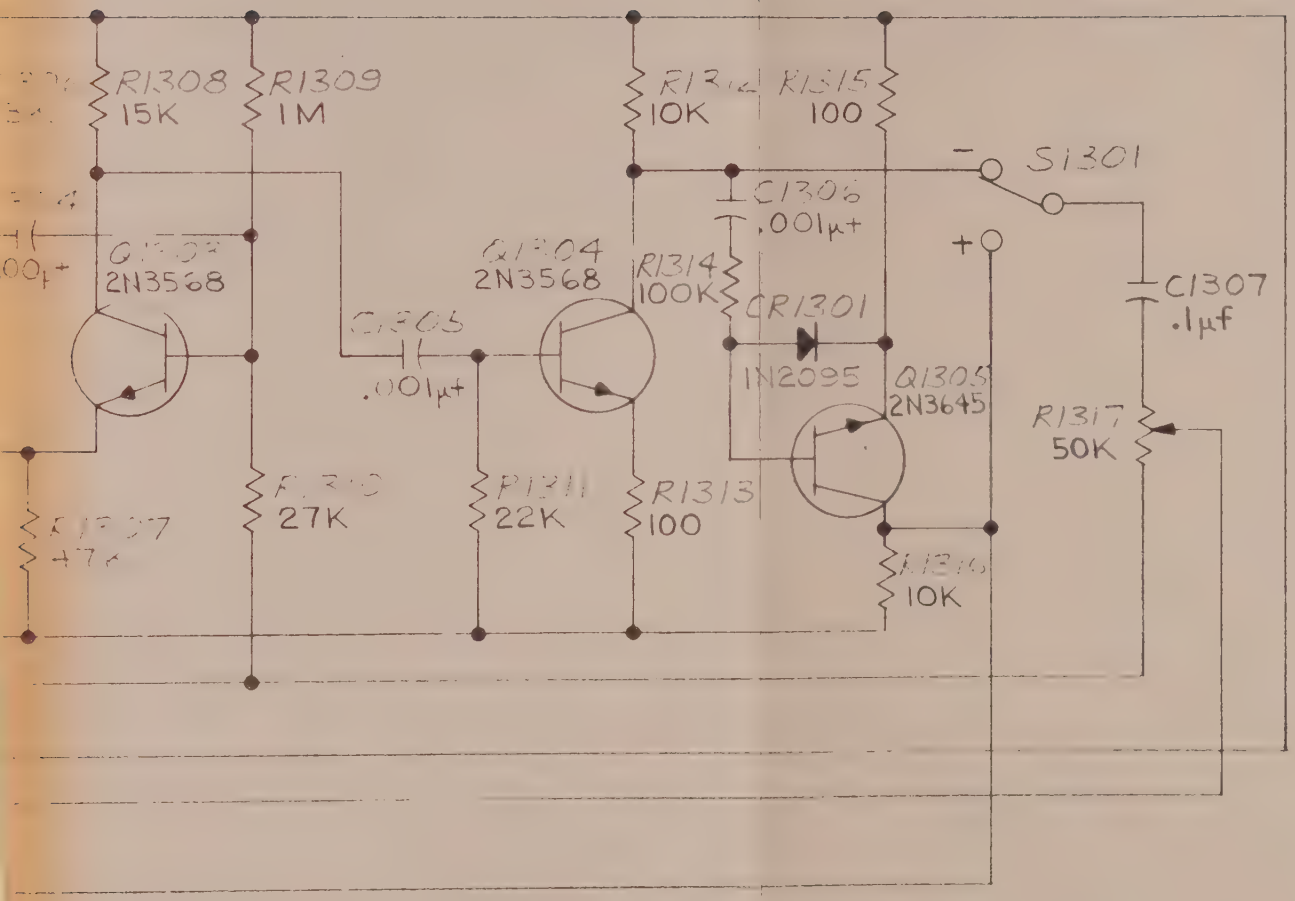

R1210 C1204
10K 4700pf
R1211
1K
R1213
10K
Q1205
2N3645
I1201
28V
40MA
C1203
1000pf
R1212
100K
Q1203
2N3645
Q1204
2N3645
R1214
10K
C1205
.1μf
CR1201
ZA18
Q1206
2N3568
R1217
4.7K
R1216
100K
½ W
R1215
100K
CR1202
ZA12

. 4 WATT, 10%
...ED.



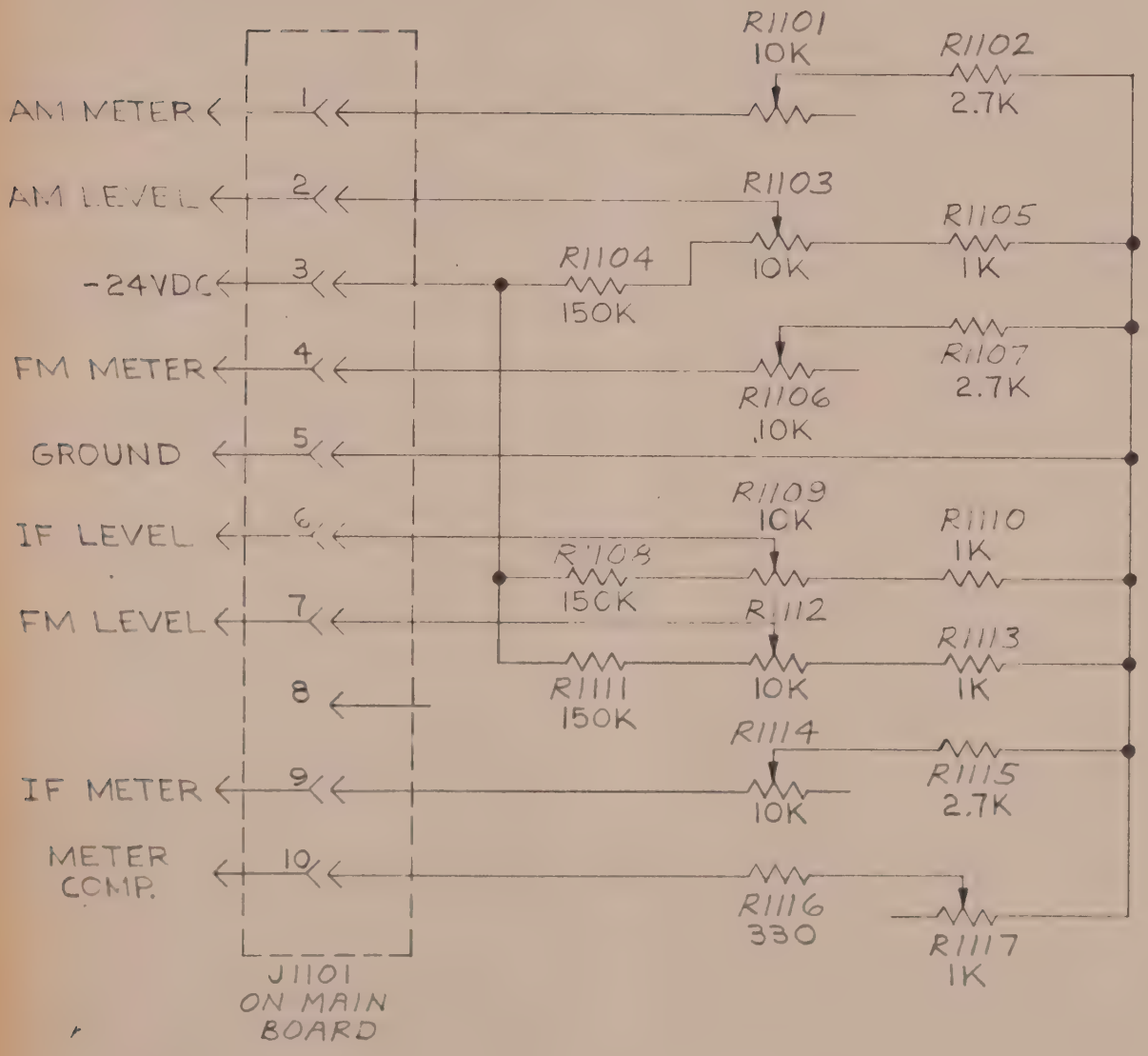
NOTE:

ALL RESISTORS A
UNLESS OTHERWISE



E 1/4 WATT, 10%
SPECIFIED.

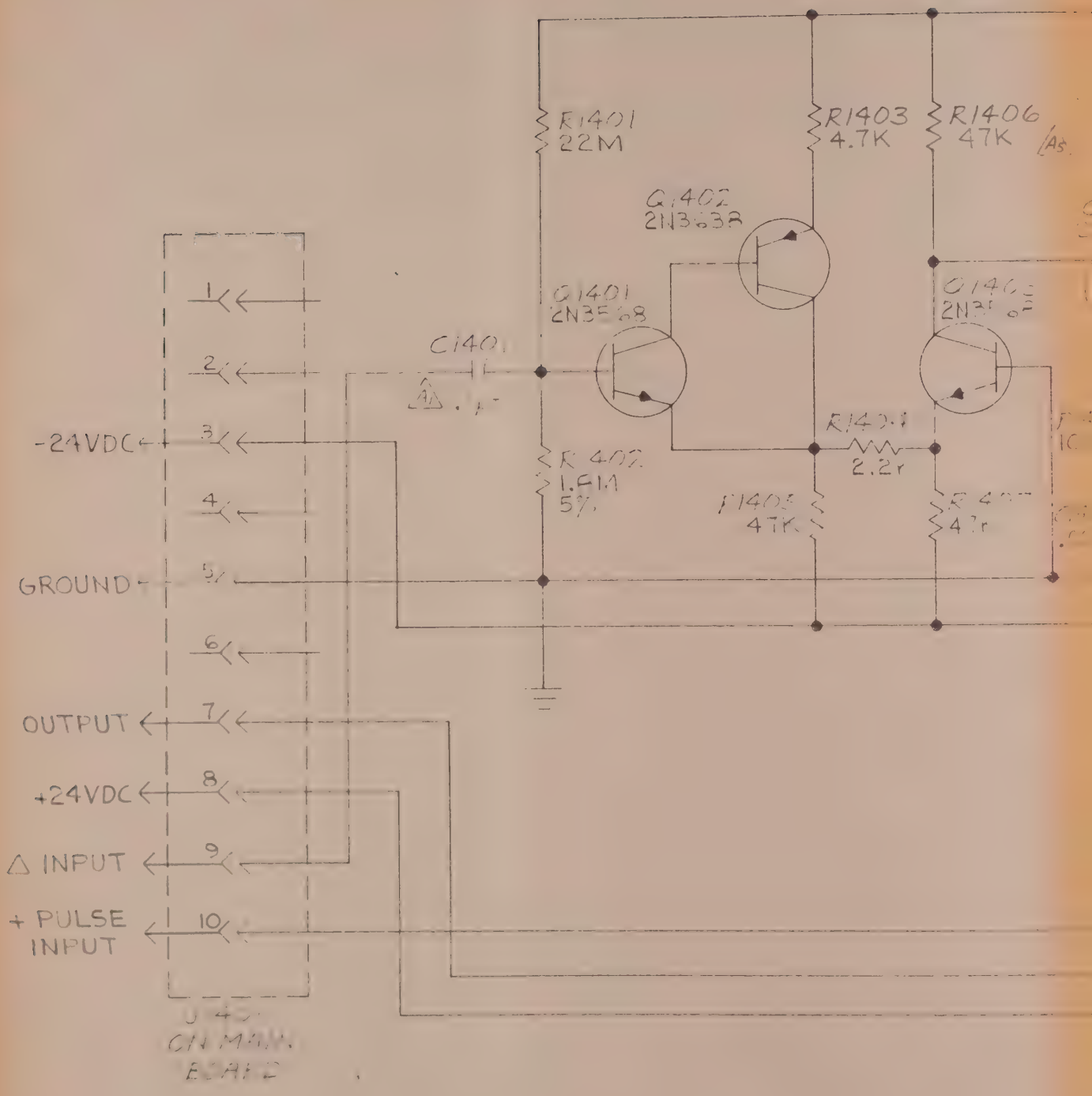
SC556018



NOTE:

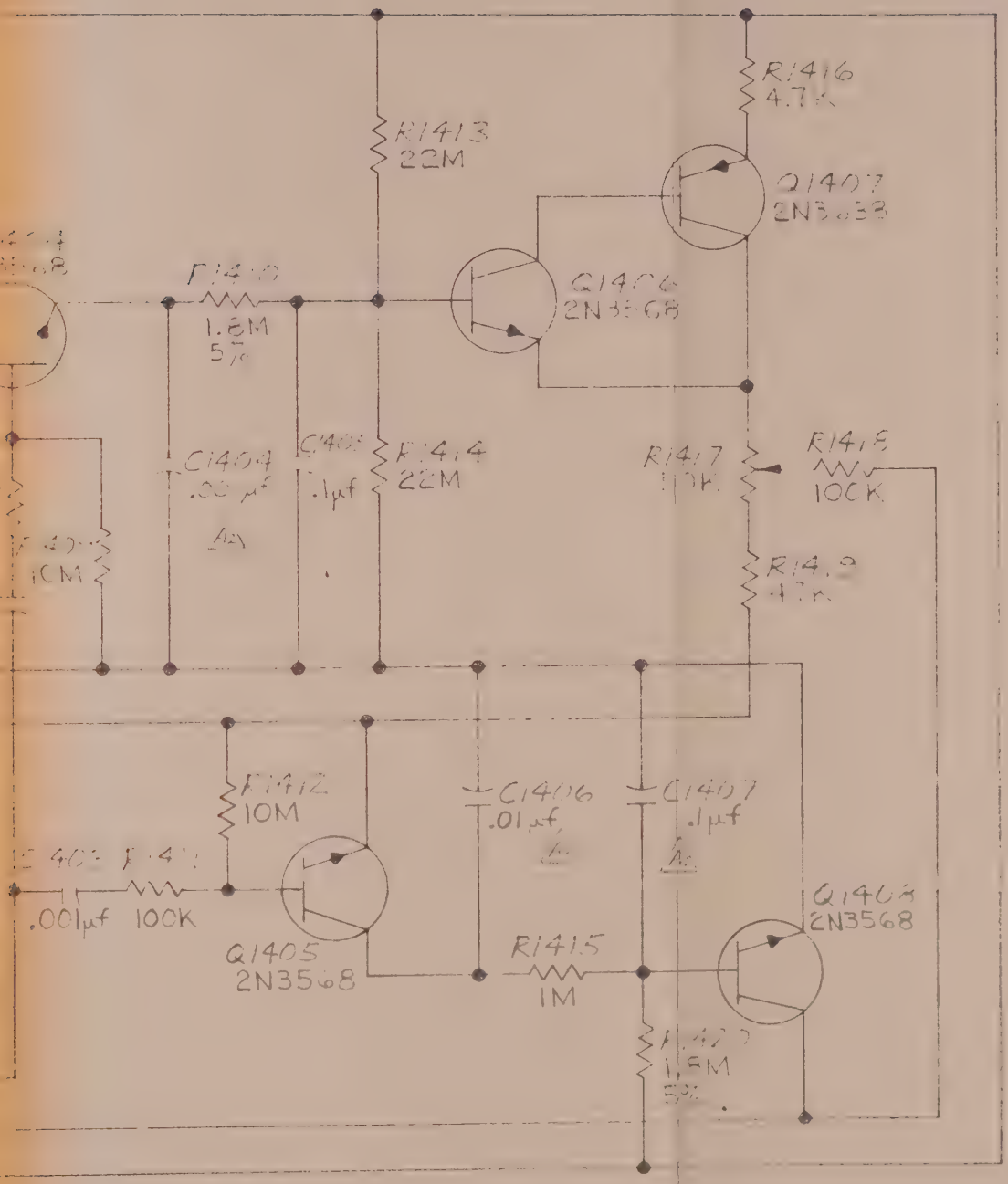
ALL RESISTORS ARE 1/2 WATT, 10%
UNLESS OTHERWISE SPECIFIED.

SB 556 014

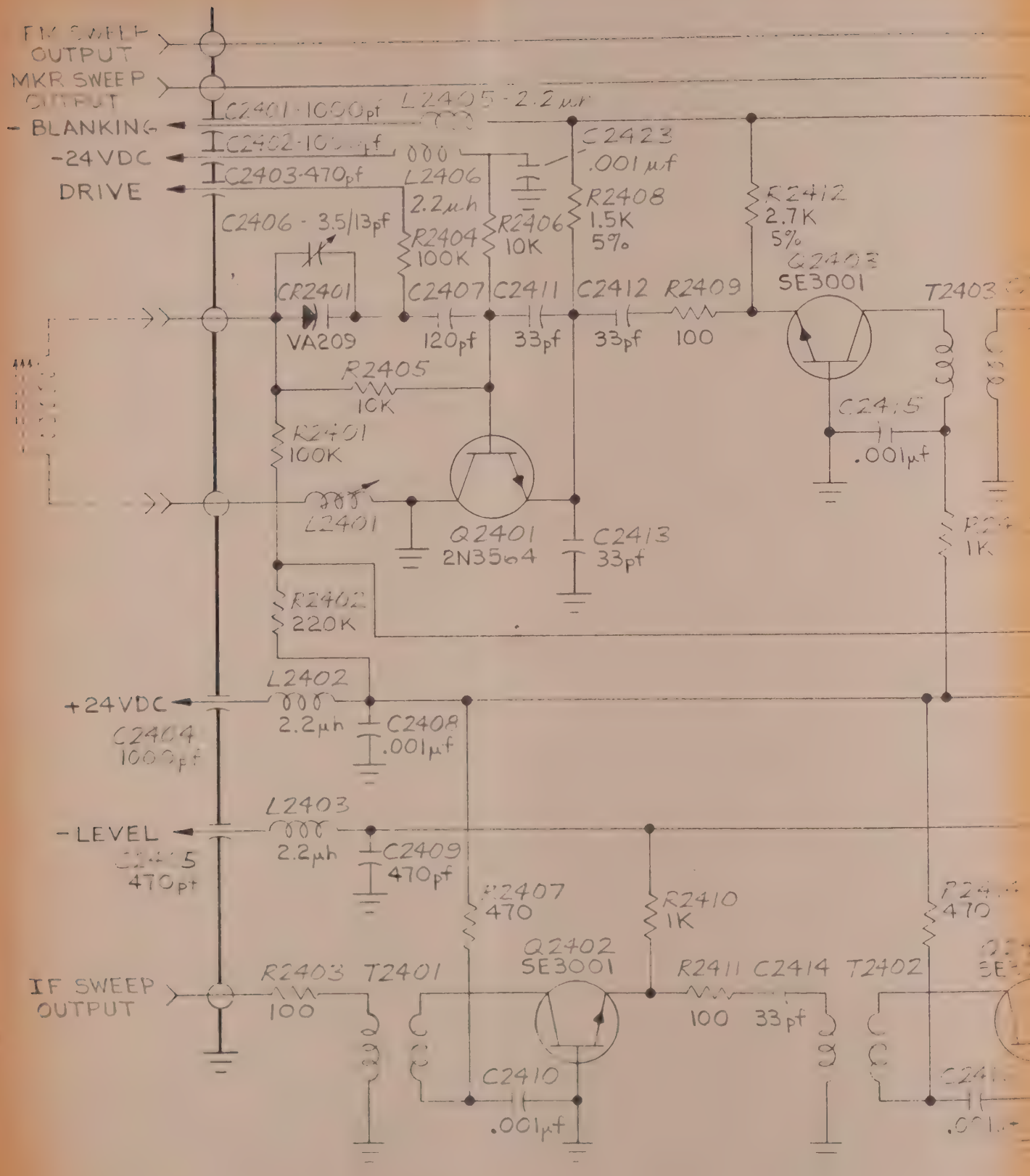


NOTE:

ALL RESISTORS ARE
UNLESS OTHERWISE

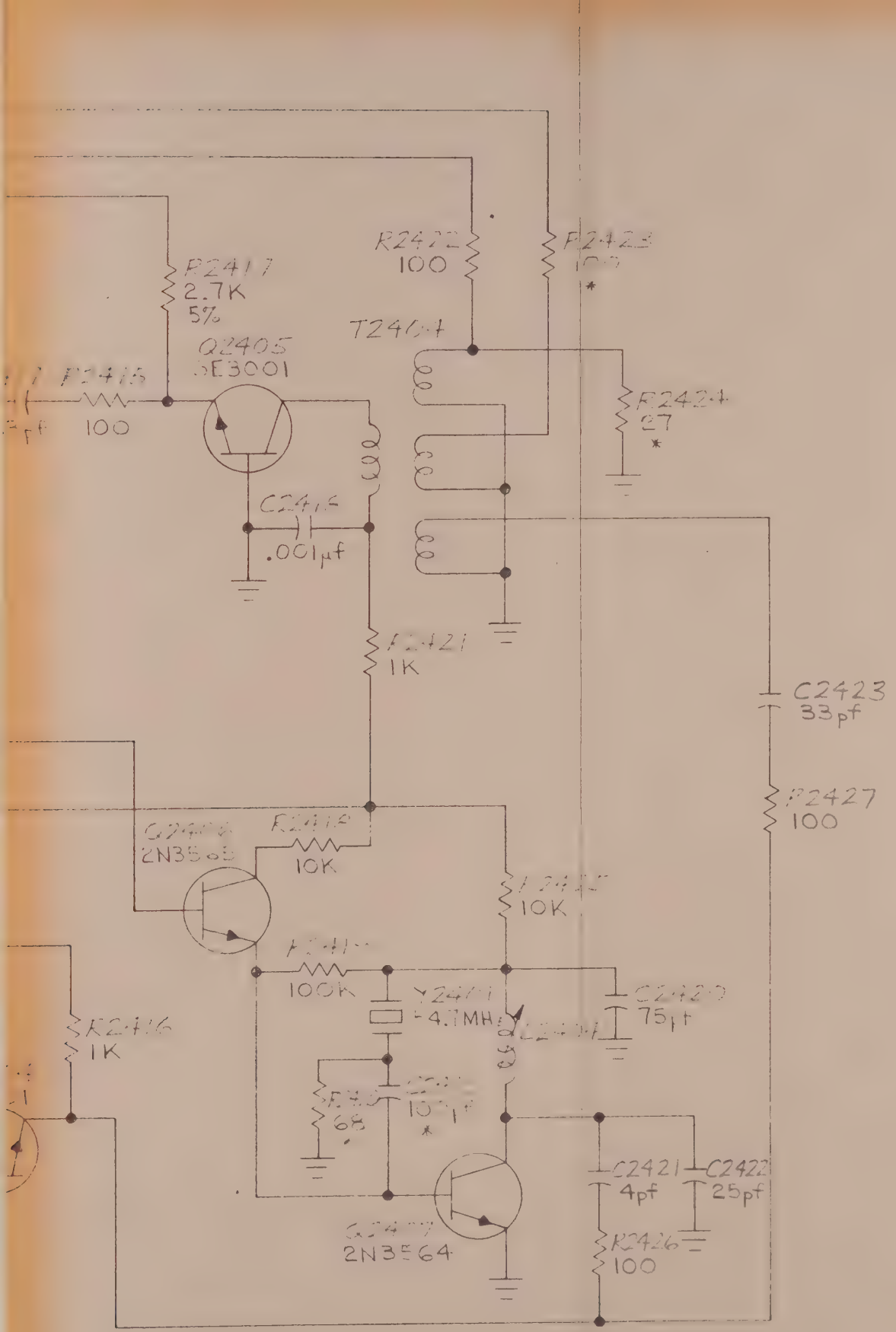


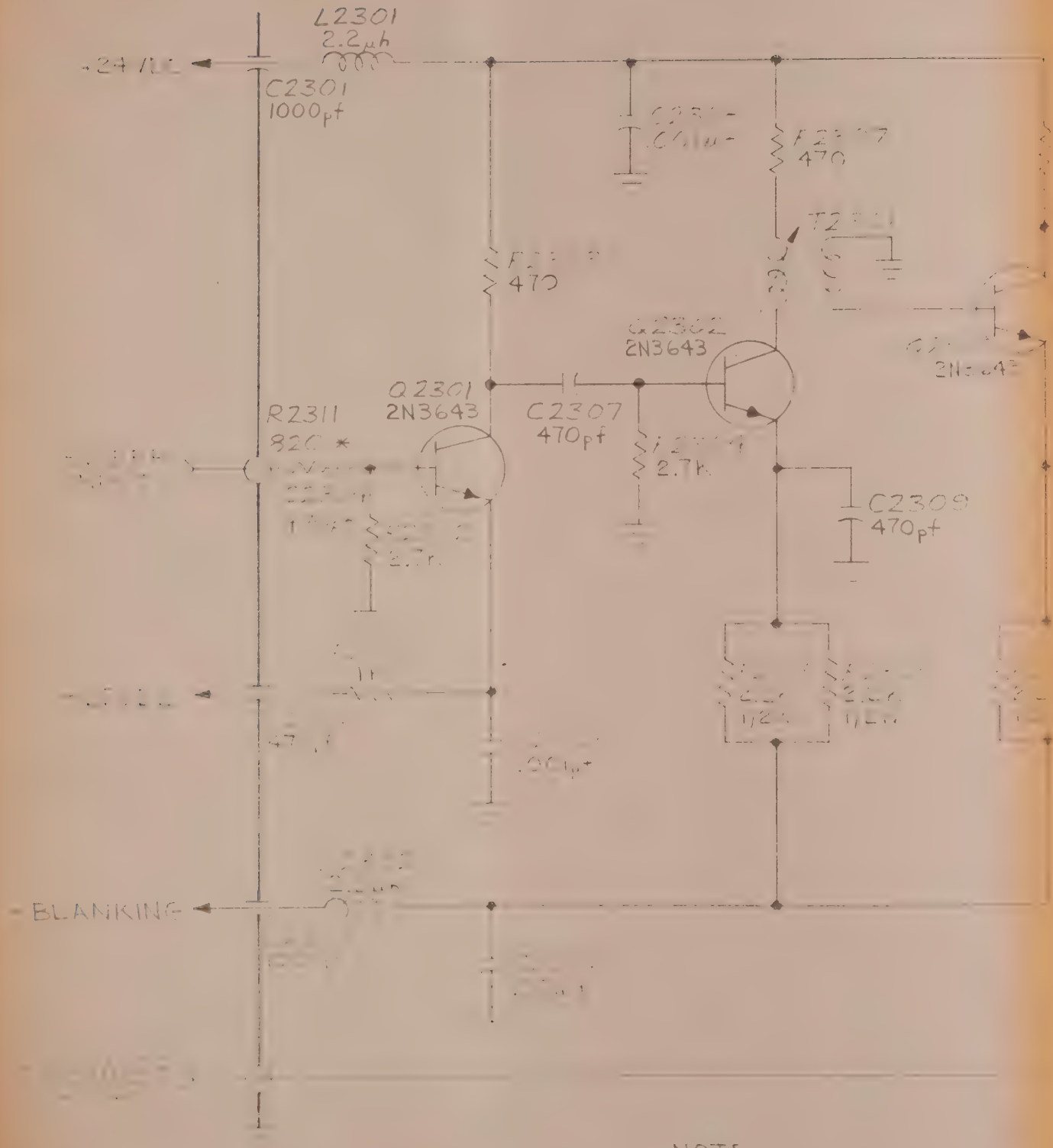
1/4 WATT, 10%
IFIED.



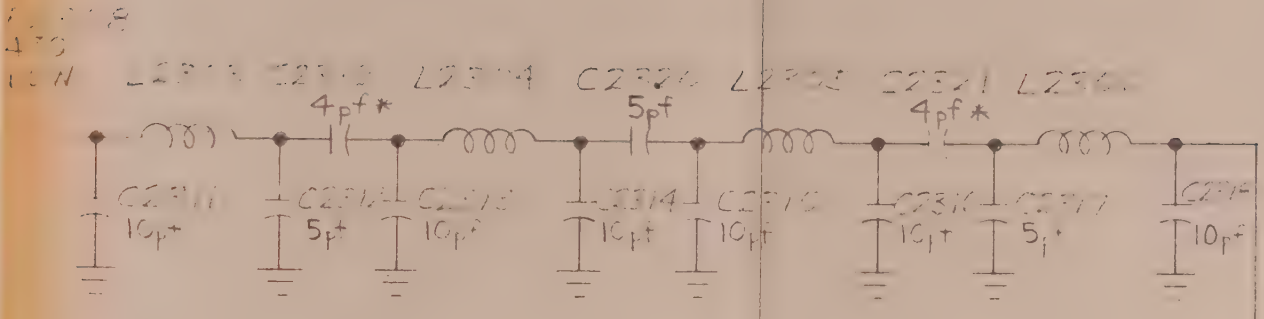
NOTE:

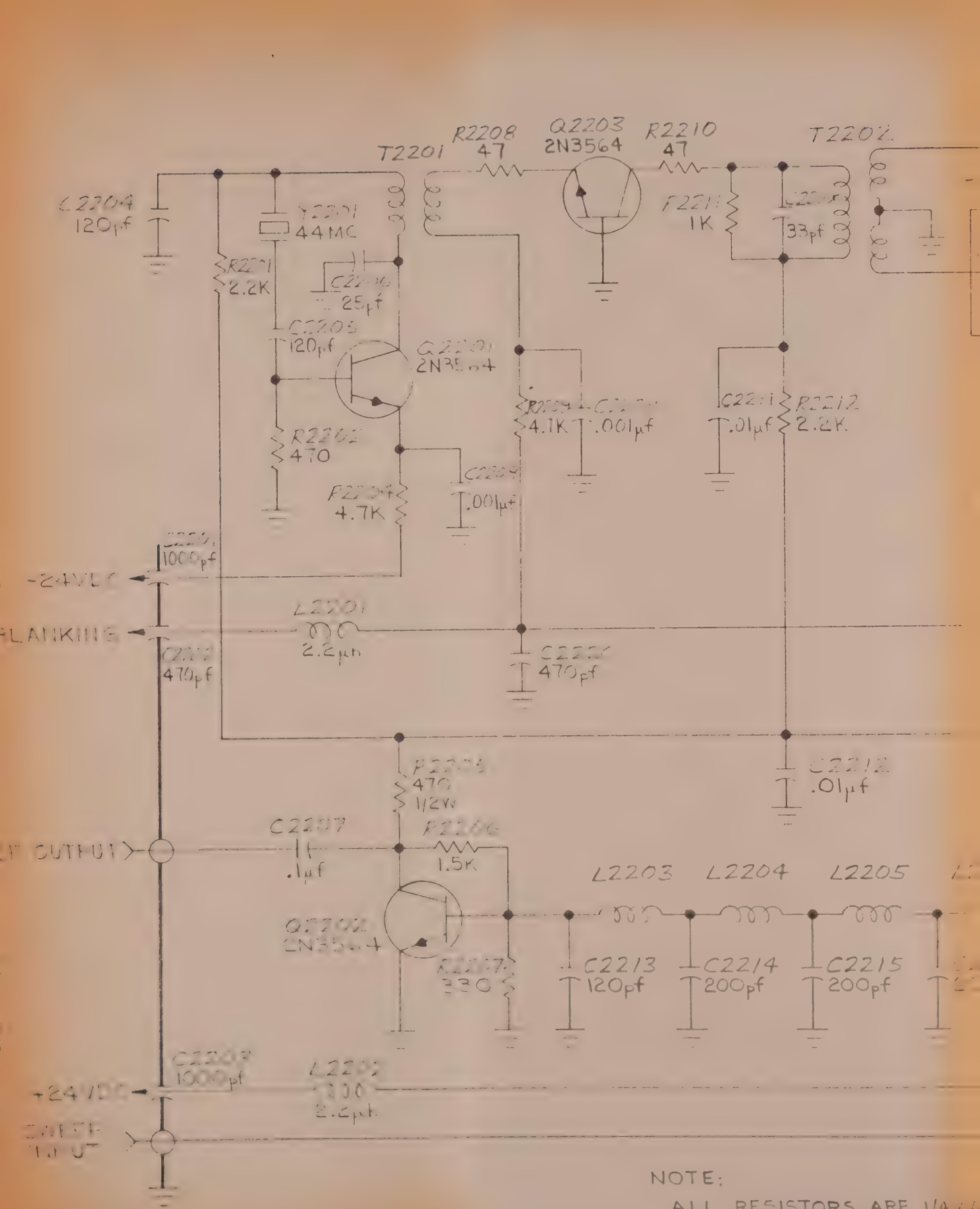
ALL RESISTORS ARE 1/4 WATT, 10% UNLESS OTHERWISE SPECIFIED.


R2417
2.7K
5%
R2422
100
R2423
100
*
T2401
Q2405
SE3001
R2415
100
R2424
27
*
C2416
.001μf
R2421
1K
C2423
33pf
R2427
100
Q2406
2N3565
R2418
10K
10K
100K
Y2401
4.1MH
C2420
75pf
R2416
1K
68
10pf
*
C2421
4pf
C2422
25pf
Q2407
2N3564
R2426
100


L2301
2.2μh
C2301
1000pf
470
470
Q2302
2N3643
Q2301
2N3643
C2307
470pf
2.7k
C2309
470pf
BLANKING

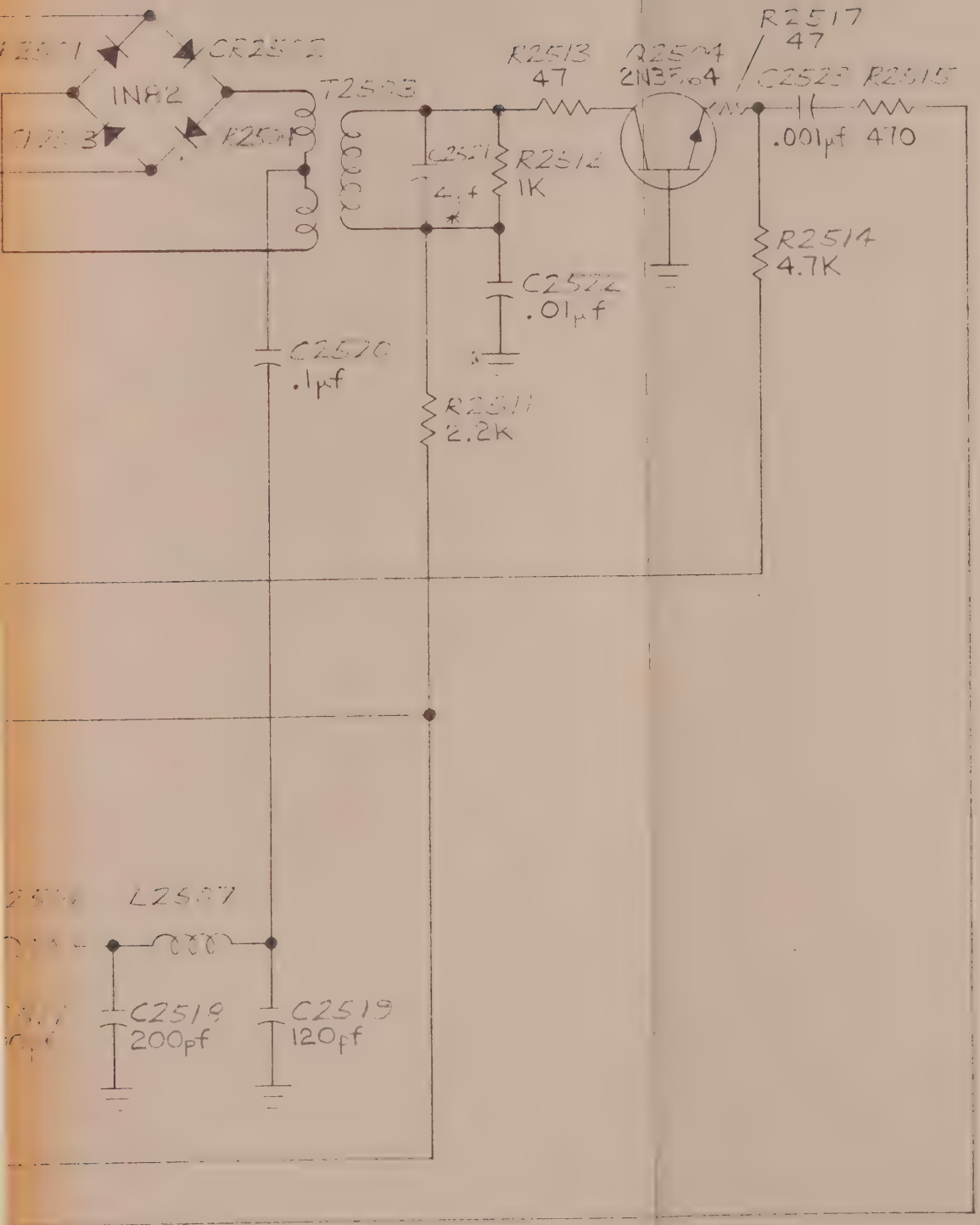
NOTE:


4pf *
5pf
4pf *
10pf
5pf
10pf
10pf
10pf
5pf
10pf



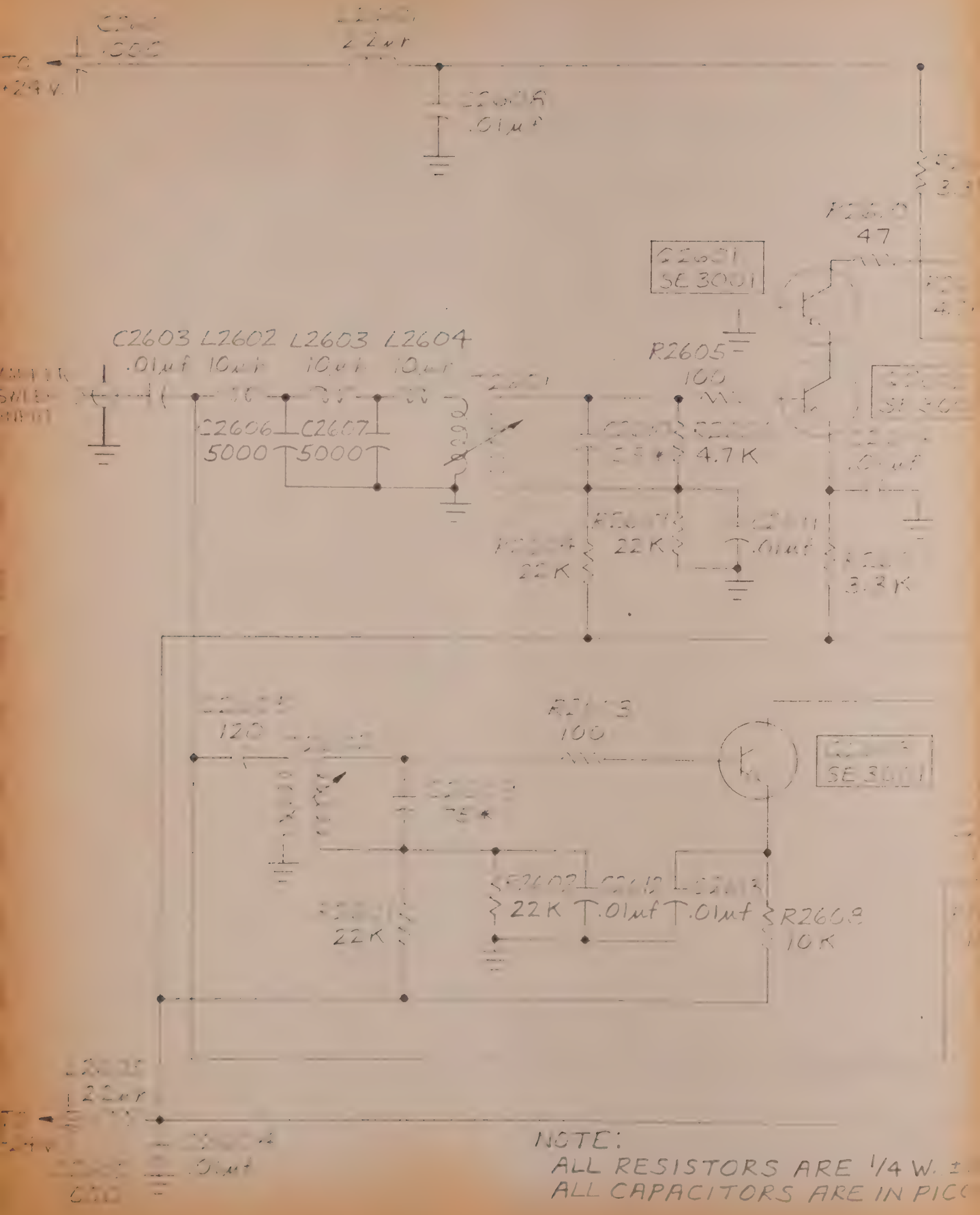
NOTE:

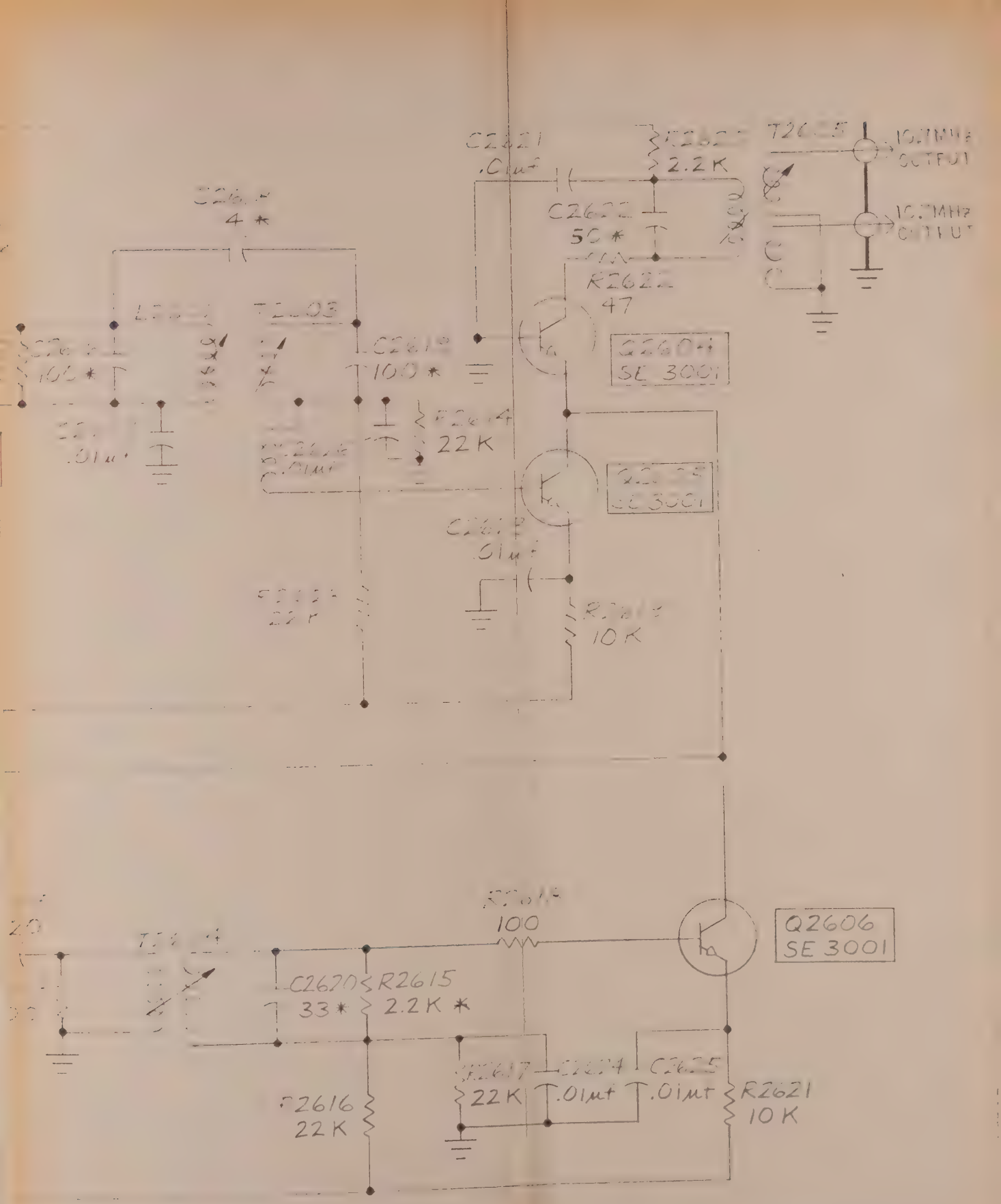
ALL RESISTORS ARE 1/4 W
UNLESS OTHERWISE SP



TI, 10%
MFD.

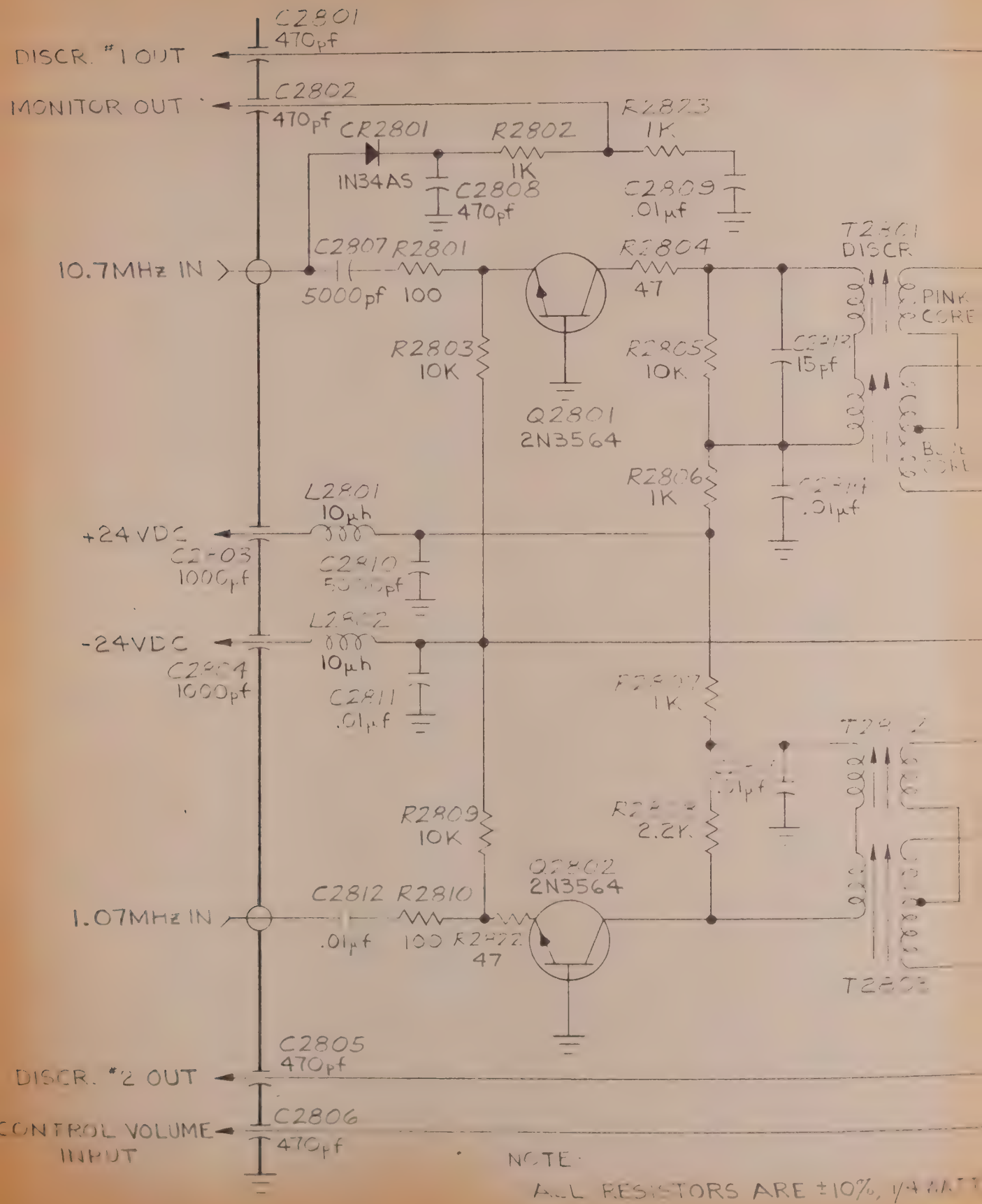
CONFIDENTIAL

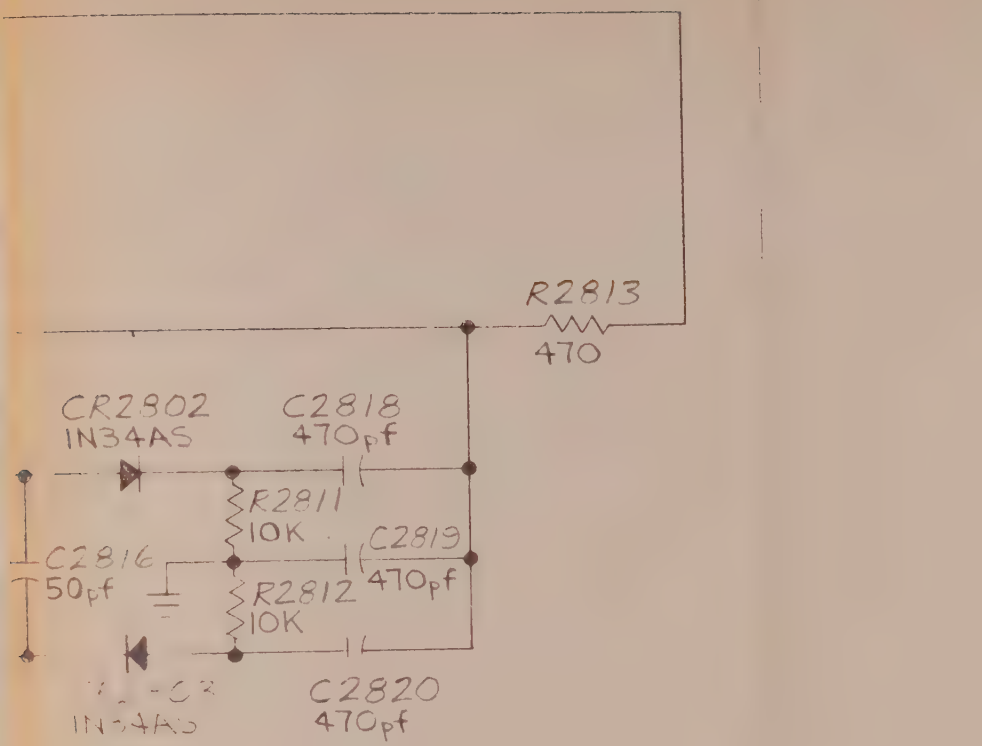

C2603 L2602 L2603 L2604
.01μf 10μh 10μh 10μh
C2606 C2607
5000 5000
R2605
100
4.7K
22K
.01μf
3.3K
47
SE 3001
120
100
SE 3001
22K
.01μf
.01μf
R2609
10K
22μh
.01μf
NOTE:
ALL RESISTORS ARE 1/4 W.
ALL CAPACITORS ARE IN PIC

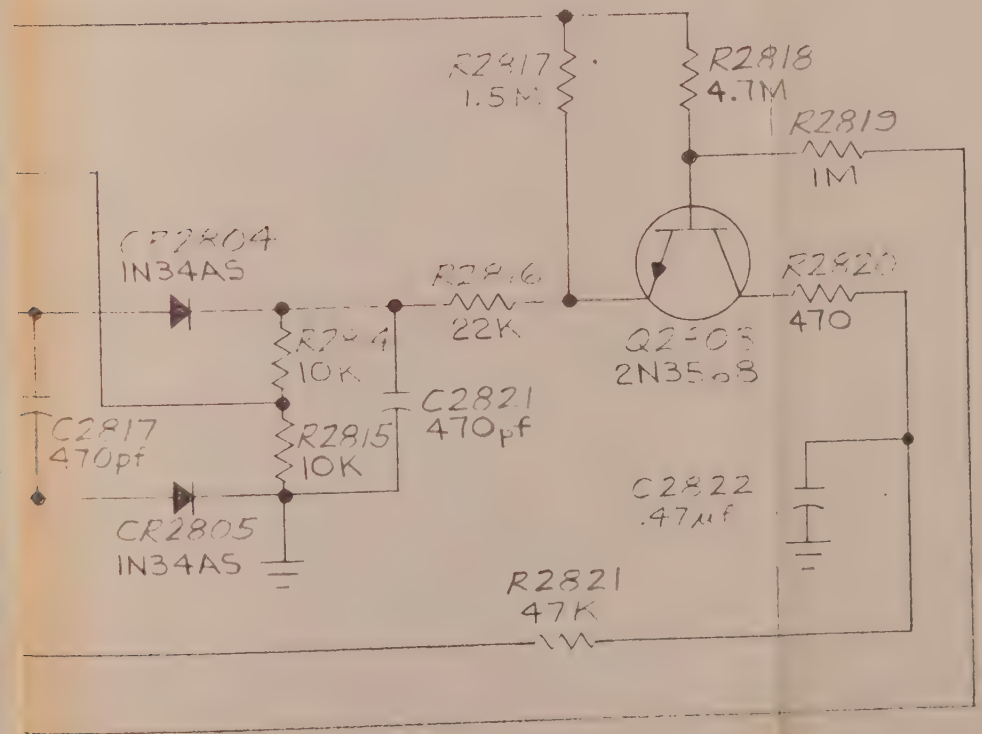


UNLESS OTHERWISE SPECIFIED.
FRACTIONS UNLESS OTHERWISE SPECIFIED.

SB556007
OLD NO SB007-0127

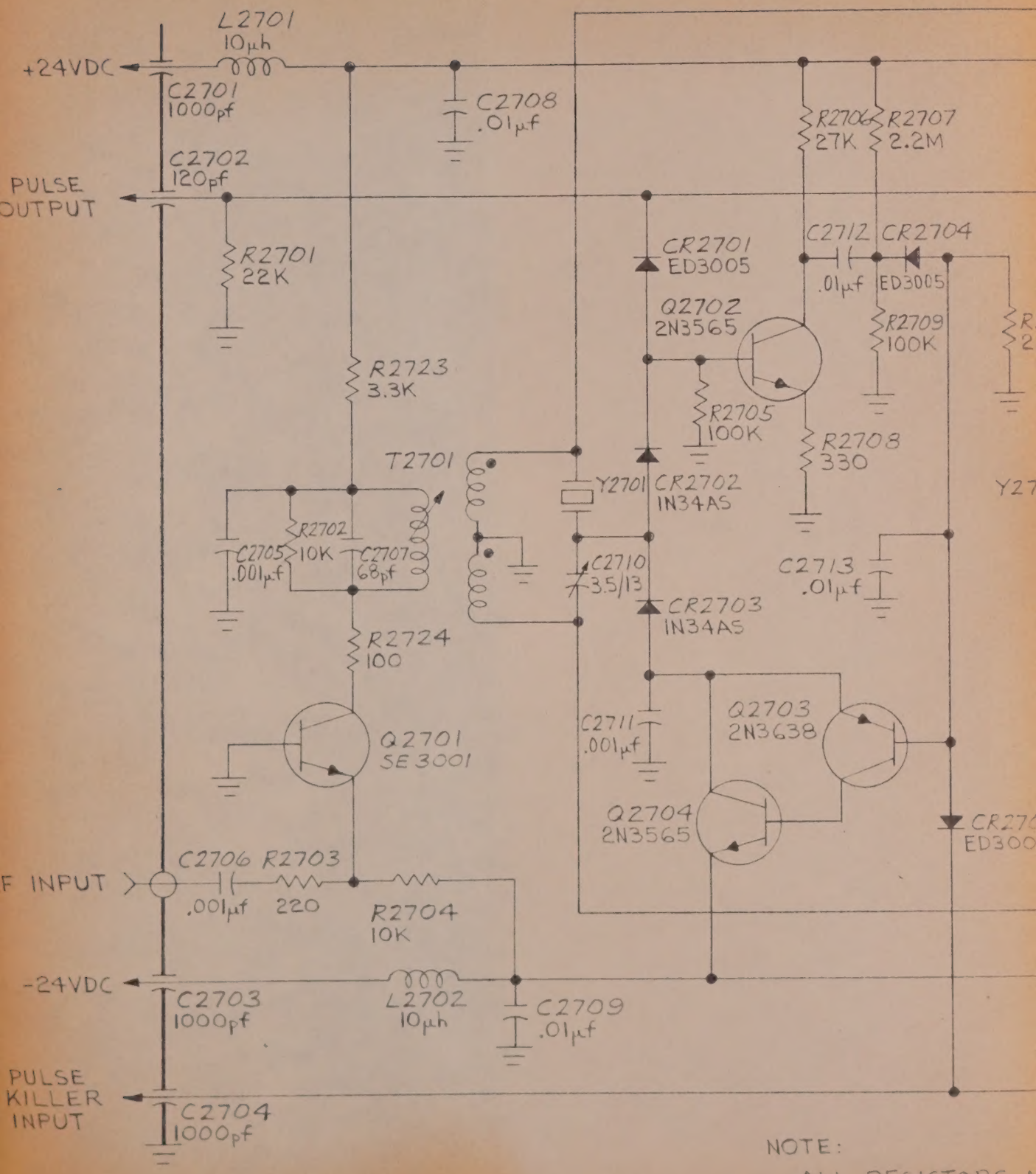

C2801
470pf
DISCR. #1 OUT
C2802
MONITOR OUT
470pf
CR2801
IN34AS
R2802
1K
C2808
470pf
R2823
1K
C2809
.01µf
C2807
5000pf
R2801
100
10.7MHz IN
R2804
47
T2801
DISCR
PINK CORE
R2803
10K
R2805
10K
C2812
15pf
Q2801
2N3564
R2806
1K
L2801
10µh
+24VDC
C2803
1000pf
C2810
L2802
10µh
-24VDC
C2804
1000pf
C2811
.01µf
R2809
10K
R2808
2.2K
Q2802
2N3564
C2812
.01µf
R2810
100
R2822
47
1.07MHz IN
T2802
C2805
470pf
DISCR. #2 OUT
C2806
470pf
CONTROL VOLUME
INPUT
NOTE:
ALL RESISTORS ARE ±10%, 1/4 WATT





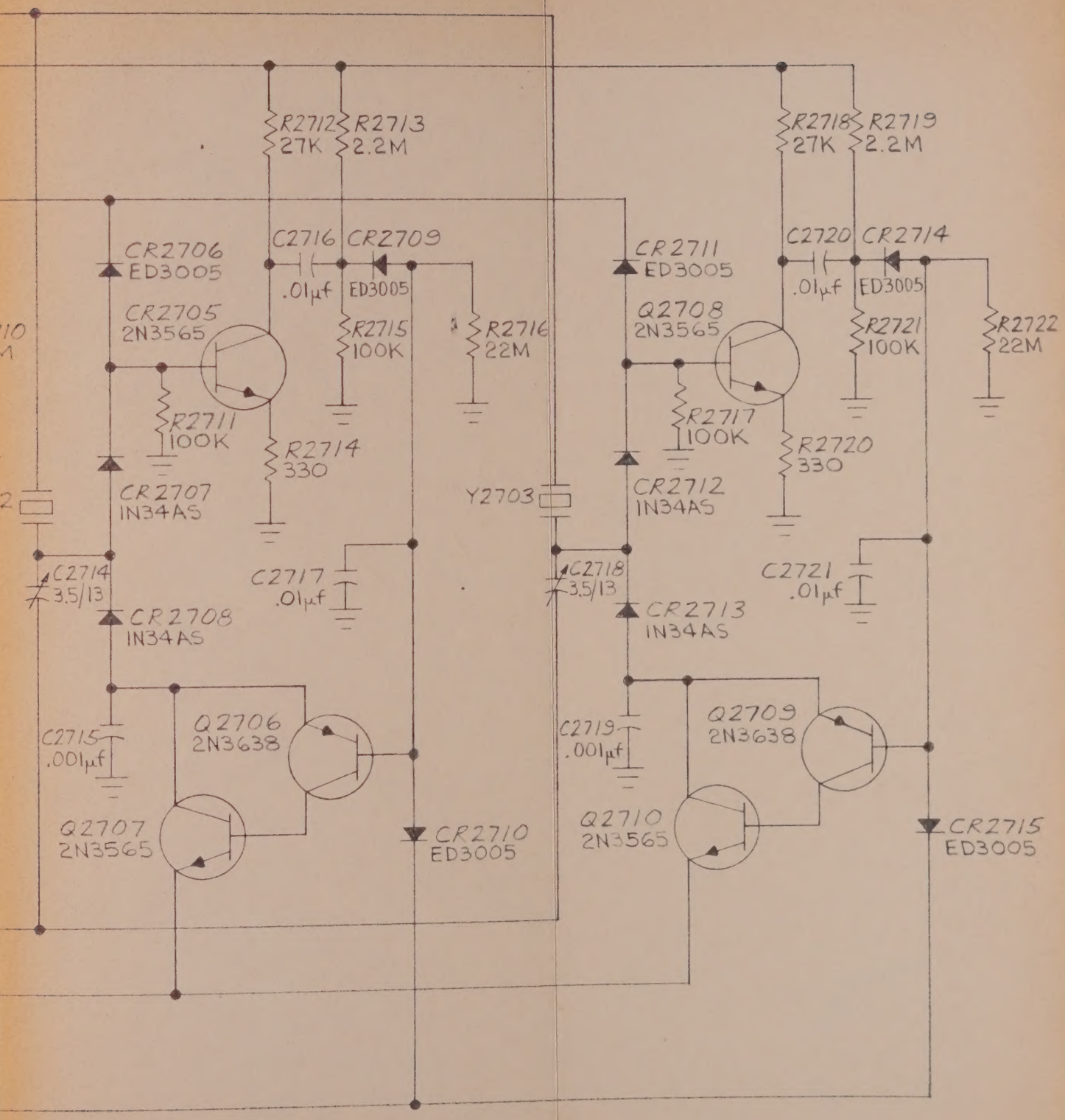
UNLESS OTHERWISE SPECIFIED.

SB556008



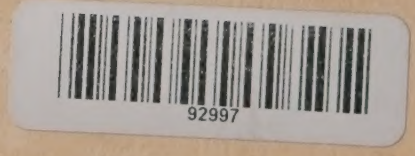
NOTE:

ALL RESISTORS A
UNLESS OTHERWISE



E 1/4 WATT, 10%
SPECIFIED.

SC556026
OLD NO. SC007-0147


92997